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CHICHILTICALLI.

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Among the many extraordinary episodes of the Spanish conquest of America, the expedition of Coronado to the "seven cities" of Cibola and the province of Quivira is perhaps the most interesting one to the people of the United States. The story of an exploration 367 years ago, which covered 14 degrees of latitude and 18 of longitude; passed through the States and Territories now called Sinaloa, Sonora, Arizona, New Mexico, Oklahoma, Texas and Kansas; discovered the Rio Grande and the Colorado and the Grand Cañon of the latter, the Indian pueblo tribes, the Apache nation, and the buffalo of the great plains, and did all this in the short space of two years (1540–1542), must always have an intense charm for students of the early history of our country. It is not the writer's purpose to repeat a relation which has been so well told by Simpson, Bandelier, Hodge, Winship, and others; the object of this paper being only the much-debated location of a point in Arizona, which forms a conspicuous landmark in the narratives of Coronado and his companions, the place named "Chichilticalli" or the "Red House."

When Friar Marcos de Niza returned in 1539 from his reconnoissance of Cibola, he represented (according to Coronado) that the place called Chichilticalli was situated at the head of the arm of the sea now known as the Gulf of California, about five leagues from the coast. Captain Melchior Diaz, who commanded the scouting party sent out from Culiacan over the friar's route in November of the same year, penetrated to the same locality, where he was

turned back by cold and snow. In 1540 Coronado rested there two days on his way to Cibola, and found it to be much further from the coast than the friar had reported. The historians of this expedition recorded these important facts,—that Chichilticalli marked a change from northwest to northeast in the direction of the march; that there the thorny vegetation ceased, and the pine-covered mountains began; and that the character of the inhabitants altered, the people in its vicinity being wild and savage, roaming over the country, and subsisting by hunting. In the entire length of the journey from Culiacan to Cibola, the only places noted as worthy of detailed description are the valley of the Hearts (Corazones) and Chichilticalli, the Red House. At the former, below the Señora river, a party was left to establish a depot of refuge in case of disaster, which was afterwards removed to a better location in the Suya valley, and then called the settlement of San Hieronymo. At Chichilticalli they had left the settled country, to enter on the deserted region, and begin the last and roughest stage of their journey to the "seven cities of Cibola."

In this paper it is taken for granted that the Cibola of Coronado is the "Old Zuñi" of the present day, situated in lat. 35° and long. 109° approximately. The great majority of critics agree on this as its location; including Gallatin, Squier, Whipple, Turner, Kern, Simpson, Hodge, Powell, Mindeleff, Haynes, Bandelier, and Cushing. The evidence of Espejo in 1583; and that of the Atlas Historique, Amsterdam, 1732; and Jefferys' Atlas, London, 1773, accord with this view.

Chichilticalli Theories.

Mr. E. G. Squier[12] in 1848 located Chichilticalli north of the Gila river, between the meridians of 109° and 110°, in a locality which corresponds to the vicinity of the present Clifton, Arizona, but would require the direction of Coronado's march, thence to Cibola, to have been due north, instead of northeast, as stated in all the narratives. Mr. Squier identified the Nexpa river of the itinerary with the Gila.

Mr. R. H. Kern[14] located Chichilticalli in long. 109° and below lat. 32° on his map made in 1853 for Schoolcraft. This corresponds to about the point where the El Paso and Southwestern Railroad crosses the boundary line between Arizona and New Mexico, about 30 miles southeast of Fort Bowie. Mr. Kern says that he assumed this position arbitrarily, but as correctly as possible from the data on hand.

Mr. Lewis H. Morgan[15] in 1869 stated that "a comparison of the narratives tends to show that it was either upon the Gila or directly north upon the Salinas," and in a foot-note that "there is no ruin on the Gila at the present time that answers to this description," namely—that given by the chronicler Castañeda.

General J. H. Simpson[16], an Engineer officer of the U. S. Army, in 1869, identified Chichilticalli with the Casa Grande ruin on the Gila river; and his verdict has been generally accepted by compilers like Bancroft, and writers of Arizona guide-books. Critical students of the original reports of the expedition of 1540 have not been satisfied with Simpson's argument, and have diligently sought for a more fitting location.

A. F. Bandelier[19] endorses the objection made by Morgan (see above), and concludes that the true site must be looked for in the south-eastern corner of Arizona, within the quadrangle bounded by the San Pedro and Gila rivers, the western line of New Mexico, and the northern boundary of Sonora, practically returning to Kern's arbitrary location.

Geo. P. Winship[18] locates the last stage of the march as following very nearly the line of the present road from the Gila to Fort Apache, implying that Chichilticalli was situated to the eastward of Old Camp Grant or in the vicinity of the Arivaypa cañon.

F. W. Hodge[22], the editor of the *American Anthropologist*, concludes that the "route left the San Pedro in the vicinity of the present Benson, went through Dragoon and Railroad passes as the railroad does now, and reached the Gila at or near Solomonsville, in which vicinity was the much mooted Chichilticalli." Dr. Elliott Coues[22] says that "this is the closest approximation ever made to the actual route, as it is also the most critical study of all that relates to the itinerary."

F. S. Dellenbaugh[20] disagrees with all the previous writers, and holds that Coronado crossed the Sierra Madre about the pass of Carretas in Sonora, and that the true site of Chichilticalli is probably not many miles from the Casas Grandes of Chihuahua. This theory has nothing to support it except one brief statement of direction in Castañeda's belated narrative, and is directly opposed to every other fact recorded in the history of the journey.

Authorities.

Among the contemporary authorities for the facts of Coronado's expedition, the only ones which specifically mention Chichilticalli are Castañeda[5], Jaramillo[6], and Coronado[4] himself in his letter

to the Viceroy Mendoza. The first-named did not accompany Coronado, but followed him with the main army, and says that he wrote his account of the expedition at Culiacan twenty years after the events; so his unsupported remarks about Coronado's feelings on seeing the ruined red house at Chichilticalli are not entitled to much weight as evidence. Jaramillo was a Spanish officer who did accompany Coronado's advanced party. His relation gives an itinerary of the march which is richer in topographical details than any other account, but makes no mention of a house or a ruin at Chichilticalli. Coronado mentions Chichilticalli several times in various important connections, but says nothing of a house or a ruin. These narratives are consulted most readily in their English translations by Geo. P. Winship, in the 14th Annual Report of the Bureau of Ethnology, which also contains the Spanish text of Castañeda's relation. Another authority, Mota-Padilla[6], who wrote his History of New Galicia two centuries later, is quoted by Winship and by Bandelier, as he is supposed to have had access to some other independent and now unknown account of the expedition. The letters of the Viceroy Mendoza[3] to the King of Spain, and the anonymous *Relacion del Suceso*[7] and *Traslado de las Nuevas*[8] afford some indirect information of considerable value.

The Approach to Chichilticalli.

The approach to Chichilticalli is best described in the words of the pioneers themselves. It is difficult to fix the site of the starting-point of this portion of the journey, the valley of the Hearts [Corazones], the narratives being vague as to its location. Jaramillo's account[6] is as follows:

"The seventy horsemen who went with the General went in a northwesterly direction from this place [Culiacan]. . . . He pursued this direction, though with some twisting, until we crossed a mountain chain where they knew about New Spain, more than 300 leagues distant. To this place we gave the name of Chichilticalli, because we learned that this was what it was called from some Indians whom we left behind. . . . About two days were spent in this village of Hearts [Corazones]. . . . We went on from here, passing through a sort of gateway, to another valley very near this stream, which opens off from this same stream, which is called Señora. It is also irrigated, and the Indians are like the others. This valley continues for six or seven leagues, a little more or less. . . . From here we went on near this said stream, crossing it where it makes a bend, to another Indian set-

tlement called Ispa. . . . From here we went through deserted country for about four days to another river, which we heard called Nexpa. . . . We went down this stream two days, and then left the stream, going toward the right to the foot of the mountain chain in two days' journey, where we heard news of what is called Chichilticalli." [Winship's translation.]

Coronado's report[4] says that "the sea turns towards the west directly opposite the Hearts for 10 or 12 leagues," and that the people told him that this valley of the Hearts "is a long five days' journey from the western sea"; also that he "set out from the Hearts and kept near the sea coast as well as I could judge; but, in fact, I found myself continually further off."

Castañeda's account[5] says that the army under Arellano's command "reached a province which Cabeza de Vaca had named Hearts, because the people here offered him many hearts of animals. He [Arellano] founded a town here and named it San Hieronymo de los Corazones, . . . it was afterwards transferred to a valley which had been called Señora."

In another place he speaks of the Hearts as being "below the valley of Señora [*abajo dell ualle de Señora*]," which has been incorrectly translated "down the valley of Señora." Again he says that "from Señora to the valley of Suya is 40 leagues. San Hieronymo was established in this valley. . . . The people are the same as those in Señora, and have the same dress and language, habits and customs, like all the rest as far as the depopulated region [*despoblado*] of Chichilticale. Between Suya and Chichilticale there are many sheep and mountain goats, with very large bodies and horns."

In the *Relacion del Suceso*[7] it is stated that "the best settlement of all is a valley called Señora, which is ten leagues beyond the Hearts, where a town was afterwards settled."

Description of Chichilticalli.

In Friar Marcos' report[1] there is no mention of Chichilticalli, either by name or description; but he must have spoken of it to Coronado, who states that the friar had said that the haven of Chichilticale was on the 35th degree of latitude, only five leagues from the sea, and that he [Marcos] had seen it. Castañeda[6] says that Melchior Diaz (who commanded the small party sent forward in November, 1539, to verify the friar's statements) "went as far as Chichilticalli, which is where the wilderness begins, 220 leagues from Culiacan, and there they turned back, not finding anything important."

In Viceroy Mendoza's letter[3] to the King, Chichilticalli is not named as having been mentioned in Diaz's report, but Mendoza says: "After going 100 leagues from Culuacan he began to find the country cold, with severe frosts, and the further he went on the colder it became, until he reached a point where some Indians he had with him were frozen, and two Spaniards were in great danger. Seeing this he decided not to go any farther until the winter was over."

Coronado says in his report[4]: "When I reached Chichilticalli I found that I was 15 days' distant from the sea." He mentioned no house nor ruin, and neither did Jaramillo[6], who accompanied him. Castañeda[5], who followed some time afterwards with the main army, says that the General "was much affected by seeing that the fame of Chichilticalli was summed up in one tumble-down house without any roof, though it appeared to have been a strong place at some former time when it was inhabited, and it was very plain that it had been built by a civilized and warlike race who had come from a distance. This building was made of red earth. . . . It was at the edge of the wilderness."

In another place he says: "Chichilticalli is so called because the friars found a house at this place [*comarca*, more properly "district"], which was formerly inhabited by people who separated from Cibola. It was made of coloured or reddish earth [*era de tierra colorada o bermeja**]. . . . The house was large, and appeared to have been a fortress. It must have been destroyed by the people of the district, who are the most barbarous people that have yet been seen. They live in separate cabins and not in settlements. They live by hunting. . . . At Chichilticalli the country changes its character again, and the spiky vegetation ceases. The reason is that the gulf reaches as far up [north?] as this place, and the mountain changes its direction at the same time as the coast. Here they had to cross and pass through the mountains in order to get into the level country."

If Castañeda had been present when Coronado reached Chichilticalli, his observations about the General being "much affected by seeing that the fame" of the place "was summed up in one tumble-down house without any roof" might have much weight; but as he was back with the main army, which did not reach Chichilticalli for some time after Coronado had passed on, this part of his story

* Simpson[16] quotes the French version thus: "La terre de ces pays est rouge," and this rendering is accepted by Bandelier (before the publication of the Spanish text)), who quotes it: "The soil of this region is red."

can be valued only as what he remembered (after 20 years) of some hearsay statement heard then or at some other time.

Jaramillo[6], who was with Coronado, makes no mention of a house or a ruin, but says that "they heard news of what is called Chichilticalli" before arriving there; also, that after crossing a mountain chain "to this place we gave the name of Chichilticalli, because we learned that this was what it was called from some Indians." He also refers to it as the name of a mountain chain or a pass. Mota-Padilla[9], writing 200 years later, and evidently drawing on some other and now unknown source of information, says that "they went through a narrow defile (*portezuela*), which was named Chichilticalli, which means "Red House," because there was a house there plastered on the outside with red earth, called *almagre*. There they found fir trees with fir cones full of good meat. On the top of a rock lay skulls of rams with large horns, and some said they had seen three or four of these sheep, which were very swift-footed."

The Country beyond Chichilticalli.

Coronado[4] says:

"I rested for two days at Chichilticale. . . . I entered the borders of the wilderness on St. John's eve, and for a change from our past labors we found no grass during the first days, but a worse way through mountains and more dangerous passages than we had experienced previously. . . . The way is very bad for at least 30 leagues and more through impassable mountains, but when we had passed these 30 leagues we found fresh rivers and grass. . . . There was a considerable amount of flax near the banks of one river, which was called on this account *el Rio del Lino* [Flax River]."

Jaramillo[6], who travelled in Coronado's party, says as follows:

"Crossing the mountains we came to a deep and reedy river, where we found water and forage for the horses. From this river back at Nexpa, as I have said, it seems to me that the direction was nearly northeast. From here I believe that we went in the same direction for three days to a river which we called San Juan, because we reached it on his day. Leaving here we went to another river, through a somewhat rough country, more towards the north, to a river which we called the Rafts (*de las Balsas*), because we had to cross on these as it was rising. It seems to me that we spent two days between one river and the other, and I say this because it is so long since we went there that I may be wrong in some days,

though not in the rest. From here we went to another river, which we called the Slough (*de la Barranca*). It is two short days from one to the other, and the direction almost northeast. From here we went to another river which we called the Cold river (*el rio Frio*), on account of its water being so, in one day's journey; and from here we went by a pine mountain, where we found, almost at the top of it, a cool spring and streamlet, which was another day's march. . . . From here we went to another river called the Red river (*Bermejo*), two days' journey in the same direction, but less towards the northeast. . . . From here we came in two days' journey to the said village, the first of Cibola. . . . All the waterways we found, as far as this one at Cibola, and I do not know but what for a day or two beyond, the rivers and streams run into the South sea [the Pacific], and those from here on into the North sea [the Atlantic]."

Castañeda[5], after describing Chichilticalli, says:

"From here they went on through the wilderness, and in 15 days came to a river about 8 leagues from Cibola, which they called Red river, because its waters were muddy and reddish. . . . The rest of the country is all wilderness (*despoblado*), covered with pine forests. . . . Watercress grows in many springs, and there are rose-bushes and pennyroyal, and wild marjoram. There are barbels and picones, like those of Spain, in the rivers of this wilderness. Gray lions and leopards were seen. The country rises continually from the beginning of the wilderness until Cibola is reached, which is 85 leagues, going north."

Distances and Direction of the March.

Castañeda[5] says: "It is 220 leagues from Culiacan to the edge of the wilderness, and 80 (or 85) leagues across the wilderness [to Cibola], which makes 300 or perhaps 10 more or less" for the whole distance; also, that "Petatlan is 20 leagues from Culiacan, and it is 130 leagues from here to the valley of Señora," and that "from Señora to the valley of Suya is 40 leagues."

The *Relacion del Suceso*[7] says: "The valley of Hearts is 150 leagues from the valley of Culiacan and the same distance from Cibola"; and in another place: "From the valley of Culiacan to Cibola it is 240 leagues in two directions. It is north to about the 34½th degree, and from there to Cibola, which is nearly the 37th degree, toward the northeast. . . . In 73 days we reached Cibola."

Jaramillo[6] repeatedly gives the direction from the Nexpa river to Cibola as northeast, except once rather towards the north for two

days. He reckons the journey by days, of which he specifies 40 in all, omitting them for two sections of the march, and giving 13 from the reedy river to Cibola. Coronado left Culiacan on April 22nd, 1540; arrived at the Hearts May 26th, entered the wilderness on St. John's Eve, June 23rd; crossed the San Juan river June 24th, and arrived at Cibola July 4th, according to Jaramillo, or July 7th, according to the *Traslado;* which would make a total of 77 days instead of 73, the time given in the *Relacion.*

The only statements which conflict with those stated above as to the direction are found in Castañeda, as follows:

"The country rises continually from the beginning of the wilderness until Cibola is reached, which is 85 leagues, going north. From Culiacan to the edge of the wilderness the way had kept the north on the left hand (*el norte sobre el ojo isquierdo*)."

This direction is certainly wrong, as it would have taken Coronado directly into the roughest part of the Sierra Madre, which he had tried to explore the previous summer, and from which he was forced to return. It would have brought him over to the eastern side of the cordillera, where he would cross streams flowing eastwardly, in direct opposition to all the facts given in the other narratives, including that of Coronado himself, written within a month after his arrival at Cibola. But the strongest objection to it is that it makes him abandon all opportunity of keeping touch with the ships which carried his stores, and that at the very beginning of his journey. Dellenbaugh's theory[20] of the route is based upon the absolute truth of this one statement, and he ignores or minimizes the many other assertions which conflict with it. He entirely ignores the fact, related by both Castañeda and Mendoza[3], that Coronado had tried to penetrate the country to the north of Culiacan in the previous year (1539), from which he was forced to return, having "found great scarcity of victuals there, and the mountains so craggy that he could find no way to pass forward."

He utterly ignores the positive statements of Friar Marcos and Coronado, that they followed the direction of the coast-line for 150 leagues or more; also, the course given by Jaramillo and the *Relacion,* which was northwest for three-fourths of the way and then northeast. He expresses his inability to understand the very clear and important observation by Jaramillo as to all the streams flowing to the South sea [the Pacific] as far as Cibola. Finally, his map does not agree with his text; the former showing the route as crossing the upper Yaqui just above Babispe, while the latter says

that it followed the Yaqui down for two days and then turned to the right to a range of mountains called Chichilticale.

Deductions and Conclusions.

It is impossible to reconcile the various details in the narratives, concerning either the route or the places mentioned, with our present knowledge of the country traversed. In trying to arrive at any conclusions it should be kept in mind that Castañeda did not travel with Coronado's party, and that he wrote his narrative twenty years after the time of the events; also, that Jaramillo frequently refers to the long period which had elapsed before he recorded his itinerary of the journey. On the other hand, the report of Friar Marcos, that of Diaz, as stated by Mendoza, and Coronado's letter, were written at the time when everything mentioned by them was of recent occurrence.

The only place-name along the line of march which has survived the three and a half centuries is that of the Señora valley, now called Sonora by a mere colloquial change of the word. Even the original position of the starting-point, Culiacan, has been lately disputed to the extent of a full degree of latitude. Mr. Squier[15] identified the Nexpa river with the Gila, in that part of its course where it runs through the Pueblo Viejo valley in a northwesterly direction. Morgan's map[16] places the Corazones (Hearts) west of the headwaters of the Santa Cruz river, about on the line of the present boundary between Arizona and Sonora. Simpson[16] located the Corazones at the town of Sonora (Hermosillo), on the river of the same name; and placed the settlement of San Hieronymo on what he calls the San Ignacio river, which his map shows to be the Rio del Altar. He identified the Nexpa with the present Santa Cruz river, and located the line of march down this stream and then across the desert parallel with the Santa Catalina range to the Casa Grande on the Gila above the Pima villages. Bandelier[19] places the Corazones on the Yaqui river south of the present Batuco, locates the valley of Suya on a branch of the Sonora river north of the present Bacuachi, and expresses the opinion that Coronado followed the Sonora to its headwaters. Winship[18] adopts this theory of the line of march, but says that the Nexpa may have been either the Santa Cruz or the San Pedro. Mr. Hodge[22] identifies the Nexpa with the San Pedro, and maintains that the route left that river in the vicinity of the present Benson, reached the Gila at or near Solomonsville (in which vicinity he places Chichilticalli), crossed the head of the Gila Bonita and the Salt river, and

thus attained some of the headwaters of the Colorado Chiquito. Dellenbaugh[20] places the route still further east, in the difficult country drained by the eastern affluents of the Yaqui river, between the 109th meridian and the Sierra Madre, having crossed that range in the vicinity of the present Babispe, and hence to the Florida mountains in southwestern New Mexico. There Mr. Dellenbaugh at first located Cibola, but afterwards fixed it at a site near the upper Gila, perhaps in the vicinity of old Fort West.*

No one of these routes is in harmony with all the facts related by the historians of the expedition, and no combination of them can be made to fit the record. Dellenbaugh's is the least tenable of all, being supported, as I have already shown, by only one statement of direction in one of the relations, and opposed by every fact recorded in the other narratives. A critical study of the various accounts of the journey must leave some positive impressions on the mind of the student concerning the location of the principal places mentioned. After long acquaintance with the views and arguments which have been presented, and having had an extensive personal knowledge of much of the country involved, the writer has arrived at certain conclusions respecting the disputed points, which may be stated as follows:

The Route from Culiacan ran parallel to the coast-line, and as near thereto as was practicable for travel, for about 150 leagues in a nor'-nor'westerly direction; which was followed beyond the Corazones, then changed to north for several days, and finally to northeast for 15 days before reaching Cibola.

The Valley of the Hearts (*Corazones*) was somewhere in the lower course of the present Yaqui river. All the narratives agree in stating that this valley was reached before arriving at the Señora valley. The *Relacion* gives the distance between them as ten leagues, Jaramillo says that they were very near each other, and Coronado mentions his having sent from one to the other for corn. The expression in Castañeda that the Corazones valley was "*abajo del ualle de Señora*, should be rendered "below [*i.e*, south of] the valley of Señora," instead of "down the valley of Señora," as it is usually translated.

The Valley of Señora, called by Coronado the valley of the Señor [the Lord], was that now known by the name Sonora. Castañeda's description of its settlements leaves no room for doubt on this subject, and several of the names mentioned by him have continued there to the present day.

* Romance of the Colorado River, New York, 1902, page 34.

The Valley of Suya was the final site of a Spanish settlement named San Hieronymo, which was first located in the Señora valley, but afterwards removed to Suya. There is no evidence that Coronado passed through it; on the contrary, Jaramillo, who marched with him, says very positively that they went up the Señora river, by a valley which continued for six or seven leagues to Ispa, perhaps the present Arispe. Bandelier places Suya up the Señora river north of the modern Bacuachi; Simpson located it on the San Ignacio river, which his map shows to be that now called the Rio del Altar. In view of Castañeda's statements that it was 40 leagues from Señora on a little river, and that one of the reasons for the discontent of its garrison was its location some distance from the main route, it is more than probable that it was on the stream now known as the Altar, where General Simpson placed it.

The Nexpa river, which has figured so prominently in the discussions of the probable route of Coronado through southern Arizona, is mentioned by only one of the historians, Jaramillo, whose narrative is not accessible in the original, but reaches us in an English translation of a faulty French version. It would be interesting to verify the statement that they marched "down" this stream, by reference to the Spanish text, which might bear the interpretation that they only followed the general direction of its course. If the line of march was up the Señora as far as possible, Coronado must have passed from the headwaters of that river, through beautiful though unpopulated country, directly to either the Santa Cruz or the San Pedro, both flowing northward in the general line of his route to Cibola. These two rivers are but a short distance apart, and there would be little reason ordinarily for choice between them. In Coronado's case, however, the Santa Cruz was to be preferred, as it lay nearer the coast, which he says he was striving to follow as near as he could judge, and it was probably a better settled stream than the San Pedro. The description given by Friar Marcos, of the large and fertile valley which he entered after passing four days in traversing a deserted mountain region, points to the valley of the Santa Cruz rather than to that of the San Pedro. Through this valley he "traveled five days' journey," it was "inhabited with goodly people, . . . well watered and like a garden," and the inhabitants requested him to stay there "three or four days, because that from this place there were four days' journey into the desert [unsettled country], and from the first entrance in the same desert unto the city of Cibola are fifteen great days' journey more."

According to Jaramillo, Coronado's party left the Nexpa after following it for two days, but he does not give any reason for their leaving the stream and striking out into a waterless desert. The reason is perhaps to be found in the well-known fact that the Santa Cruz river "runs dry" in the vicinity of the present Tucson. Ross Browne[17] found its bed absolutely dry at Revanton, 40 miles above Tucson, in the winter of 1863–64. If this was the reason for their abandonment of the Nexpa (presuming that it was the Santa Cruz), they must have left the river about the locality of Tucson and traveled to the northeast for two days parallel to the Santa Catalina range. This direction would bring them to the Gila river in the vicinity of the mouth of Mineral creek, some 40 miles east of the ruin now called Casa Grande, where for the first time they would find high mountains lying directly across their route. Dellenbaugh[20] identifies the Nexpa with the upper portion of the Yaqui river, where it runs north through an extremely rough country. Those who have read Captain Bourke's account[21] of General Crook's campaign against the Apaches in this region will find it difficult to believe that Coronado marched by that route, or that Friar Marcos found there a valley "inhabited with goodly people, . . . well watered and like a garden."

From the country south of the middle Gila there are four old Indian trails across the mountains leading towards the pueblo cities in the north. The western one crosses the Pinal range along the line of "Stoneman's road" to the head of Pinto creek, a southern affluent of the Salt river. The second, farther east, leads up the valley of Mineral creek, then through a rough and boulder-strewn country to the head of the Pinto, where it joins the first-mentioned one. The third crosses the Gila above the mouth of the San Pedro, and passes over the southeastern shoulder of Pinal mountain to the head of Pinal creek, and thence keeps on high land towards the upper affluents of the Salt river. The fourth crosses the Gila above its first great cañon, and traverses the comparatively easy country of the San Carlos valley in a northeasterly direction, to join with the third-named about the point where the White and Black rivers unite to form the Salt river, These trails follow the lines of least resistance through the rough mountains, and are undoubtedly very old. Coronado may have entered the mountain region by any one of them, and if he came down the Santa Cruz he would naturally have taken either of the two western-most ones. According to his own account he traversed a rough, high, timbered country for 30 leagues after entering the wilder-

ness, and any of the three trails over the Pinal range would conform to his description of the route much better than that by way of the San Carlos valley. Any one of these three routes would bring him to the narrow valley of the upper Salt river, where the settlement of Livingstone is now located, though if he took the third he would have deviated down Pinal creek (a natural road at first), instead of keeping on the high ground directly to the mouth of the Black river.

Chichilticalli. The evidence as to the position of this important place is almost irreconcilable in many essential particulars, though definite enough in other respects. Nothing positive can be deduced from the distances or bearings, though it is remarkable how every such effort points to the zone lying south of the Gila river. For example, if we take the extreme distance given for the whole journey from Culiacan to Cibola, 300 leagues, and that from Chichilticalli to Cibola, 85 leagues; and assume that the westing up to Chichilticalli is balanced by the easting beyond that point (there being less than half a degree's difference in the longitudes of Culiacan and Cibola), we arrive at a position for Chichilticalli, which is at 72½ per cent. of the whole distance, counting from Culiacan. Applying this to the ten degrees of latitude between the two extreme points, the position of Chichilticalli would lie in about lat. 32° 15′, corresponding to a line passing just north of Tucson, and through the station named Willcox, on the Southern Pacific Railroad. Using the lesser figures of the *Relacion del Suceso*, 240 and 50 leagues, and applying the same method, we arrive at lat. 32° 54′, which cuts the San Pedro just south of its junction with the Gila. Taking the latitude of old Culiacan at 26°, where Dellenbaugh places it, and using the same method with the first-named figures, the latitude of Chichilticalli would lie in 32° 31′, which is 23′ south of the second result, and 16′ north of the first one. Again, if we count backward from Cibola 85 leagues, and deduct one-third the distance for meandering in a rough country, we get 57 leagues (195 miles) in a straight line, which, applied to the map in a southwest direction from Zuñi, will bring the location of Chichilticalli about the junction of Arivaypa creek with the San Pedro river, the site of old Camp Grant. Such evidence is, however, of little value against that afforded by the description of the place itself and its surroundings.

It is in vain that we try to form any conclusion as to the site from the account of the waterways crossed north of Chichilticalli. Everywhere in that high region are found rivers flowing in deep

barrancas, and streams of cold water one or two days' journey apart. Speculation may be freely indulged by giving modern names to the rivers mentioned in Jaramillo's itinerary of this part of the journey. In this connection it should be remembered that the word *despoblado*, applied to this section of the country by the Spanish narrators, and rendered "desert" in most of the English translations, means an unsettled or deserted region rather than a sterile one, and does not correspond at all with our idea of a desert. It is more correctly rendered "wilderness" in Winship's version of Castañeda's relation.

All the narratives agree in placing Chichilticalli on the border of this wilderness, and some of them give details which show conclusively that it lay *within* that border and not outside it in the country of the settled Indian tribes. According to both Castañeda and Mendoza the party under Melchior Diaz was turned back in 1539 at this place by cold and snow. Only two writers mentioned anything about a ruined house, and they wrote after twenty years and two centuries respectively; while Friar Marcos, Melchior Diaz, Coronado and Jaramillo said nothing about such a structure, and the latter refers to Chichilticalli as the name of a mountain or a pass. Mota-Padilla said that it was approached through a narrow gate-way. It was certainly in those mountains which turned from their previous direction parallel with the route of march, and lay across the way, trending to the west like the coast of the gulf. At Chichilticalli the cactus form of vegetation ceased, and was replaced by a mountain flora; the character of the natives changed from that of a settled, earth-tilling people, to a wild and savage race, which roamed over the country and lived by hunting. The mountain sheep, seen in the vicinity; the rough country 30 leagues wide, containing many streams and fine timber, and the character of the Indians inhabiting it, unmistakably point to the conclusion that Chichilticalli was in the Apache country, and not in the region occupied by the settled tribes, through which the Spaniards had passed on their way thus far from Culiacan.

The Casa Grande near the Gila river does not suit any of the descriptions in the narratives. It is not in a mountainous, unsettled region, but stands on a settled plain, where from time immemorial the Pima Indians and their ancestors or predecessors have irrigated and cultivated the soil. It is not built of red earth, though it is possible that its walls may have been plastered with a reddish cement. It is not a single ruin, but one of several, of which no fewer than twelve were seen by Father Kühne[10] (Kino),

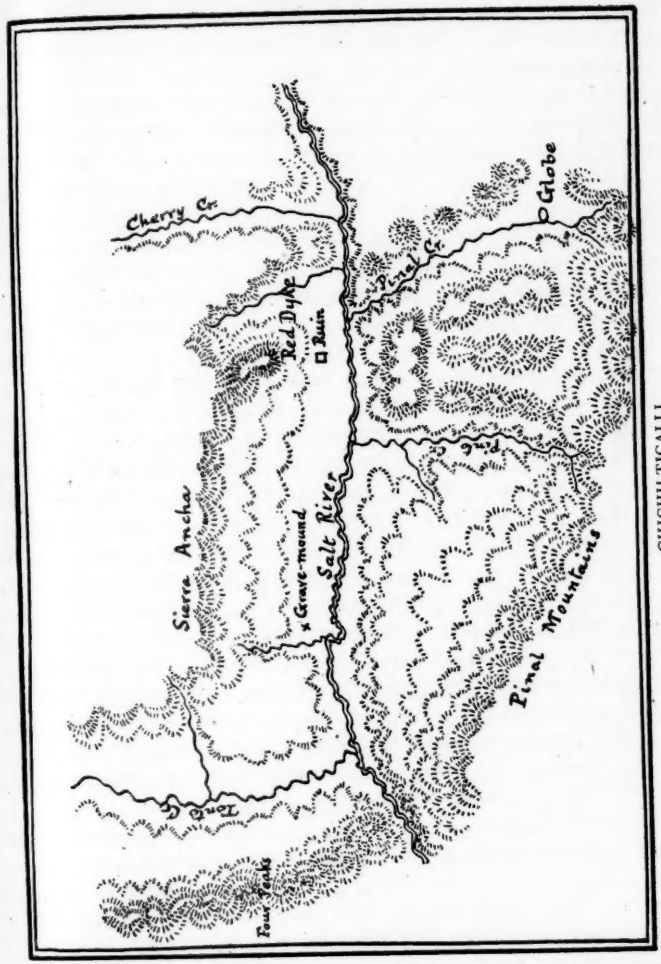
157 years after the date of Coronado's journey, and one of the twelve was then (1697) in better condition than the main building, having in its lower room a ceiling "of round timbers, smooth and not thick, which appeared to be of cedar or savin." As late as 1852, Commissioner Bartlett saw three buildings, two of which were more ruined than the central one. The thorny vegetation does not end at Casa Grande, but covers the plain and foothills beyond on the northern side of the river. It is not in the vicinity of pine-clad mountains, and is not approached by any sort of a gate-way. It stands upon a hot, arid plain, extending in every direction for many miles, and bearing a vegetation which includes the various thorny cacti and other desert plants.

The Possible Site of Chichilticalli.

Chichilticalli undoubtedly received its name from something connected with the idea of a "red house," that being the meaning of the words *Chichiltic calli* in the Aztec language. It was probably so called by some of the Mexican Indians who accompanied Friar Marcos in his first journey to Cibola. Just where or what it was no one can yet say positively, but I offer the following contribution to its identification, based on my personal knowledge of the district involved.

In one day's journey north from the Gila river, going over the Pinal range by either of the two trails first above mentioned, the traveller on horseback reaches the upper valley of the Salt river, a narrow basin some 15 miles long, in which the main stream receives the Tonto creek from the north and the Pinto creek from the south. This valley is now settled by American farmers but will soon be occupied largely by an immense reservoir formed by a dam now being built by the Government at its lower end. Before General Crook's campaign against the Pinal and Tonto Apaches in 1872, it was the centre of the region inhabited by those Indians; and in it were the main trails used by the cavalry expeditions which operated from Camp McDowell and old Camp Grant into the country known as the Tonto Basin. Approaching this valley from the south, on the road which runs along the divide between the Pinto and Pinal creeks, the traveller sees a magnificent panorama spread out before his eyes. To the left opens the head of the dark cañon of Salt river, north of which extends the majestic, granite-ribbed Mazatzal range, crowned by "four peaks," which rise to a height of 8,000 feet above the plain. Directly in front is seen the broad summit of the pine-covered Sierra Ancha, its southeastern ex-

tremity projecting over the valley as a great dyke of red rock, with projecting angles and recesses showing as the immense doors and windows of a castellated "red house," especially when the western



CHICHILTICALLI.

sun throws their shadows on its face. In the year 1868 the writer was doing topographical work for the U. S. Engineer Department, in this region, with a scouting party commanded by Major A. J. Alexander of the 8th Cavalry. During a noon-time halt in this

valley he found a grave mound, from which with slight effort he disinterred some remarkable relics in a greatly decayed condition; including human bones, an ancient saddle, which was very high in the pommel and cantle, pieces of hair rope, and the metallic parts of spurs and a bridle. At that time General Simpson's paper on the Coronado expedition had not been published, but the officers present agreed that the articles were of more ancient type than any Mexican or American horse equipments then known, and the suggestion was made that they might be relics of Coronado's army. In the following year, 1869, when returning from a scouting expedition in the country east of Cherry Creek, we entered this valley at its upper end, and soon afterwards deviated from the usual trail to follow some fresh Indian sign. While returning to the trail we came across a mound on the mesa, which, on examination, proved to be the ruin of a large building. Our business there was Apache-hunting; we were returning from an extended scout with short rations, and had a long journey to make before reaching our supply station, Camp McDowell, and nothing but hostile Indians would have influenced the commanding officer to stop for any length of time. For these reasons no detailed examination of the ruin could be made, but it left a strong impression on my mind, and I recollect writing a short account of it for the Smithsonian Institution to be forwarded through military channels. On my route-sketch, which accompanied the official report of the expedition, this place was marked "ruins," and the sketch was duly incorporated in the War Department maps of that country. This ruin stood on the mesa, about half-way between the Salt river and the great red dyke; but other ruins were subsequently found on higher ground, closer to the red mountain. In the opposite direction, half way up the hills enclosing the southwestern end of the valley, a large cliff-house, several stories high, can be seen by the naked eye from almost any position on the river.

On another occasion, in 1869, the writer accompanied a large body of cavalry under the command of Brevet Lieut.-Colonel Geo. B. Sanford, Captain 1st Cavalry, through the Pinal range. We went up Pinal creek and over the mountains to old Camp Grant, thence back across the Gila river, up Mineral creek, and over the range again to the Pinto, where we had a fight with Apaches, and then moved down to the Salt river. As we emerged from the lower cañon of the Pinto (perhaps the very gateway mentioned by Mota-Padilla), we saw to our right front the great red dyke of the Ancha range, glowing in the evening sun, which cast dark shadows as

doors and windows upon the vast mass of red rock, giving to it the very similitude of an enormous red castle. I have never forgotten the scene, and, in after years, when familiar with the story of Coronado's march, I felt that this may have been the "red house" which is so often mentioned in the Spanish narrations. It is possible, I will not say probable, that in this great dyke of red rock we have the original Chichilticalli. One who has ever seen it and noticed its resemblance to a great red castle, can easily imagine the Indian companions of Friar Marcos emerging from the gateway of the Pinto into the valley, as the western sun cast deep door-like shadows from projecting crags on the rocky face of the great red dyke, and calling out in their own language "*Chichiltic calli!*" ["red house!"] as they pointed to the gigantic red rock. The name would continue among them as the designatiom of a locality to be associated twenty years afterwards by Castañeda with the recollection of some ruin seen in the vicinity, perhaps the cliff-dwelling above mentioned, or some other structure made of the red débris lying at the base of the original "red house."

This locality lies directly on Coronado's route, as mapped by Morgan and Simpson. From it towards the Zuñi pueblos the trail passes over high, rolling, grassy country, with pine timber on the higher ranges; and crosses many tributaries of the Salt river, corresponding as to their intervening distances with the streams mentioned by Jaramillo. It is now of easy access from the end of the railroad at Globe, some 25 miles away, by a good road down Pinal creek to the head of the box cañon of that stream; thence up a dry wash to the summit of the divide between the Pinal and the Pinto, and down to the Salt river along a sharp ridge between deep, dry washes in the foothills. It must be familiar to the officers of the irrigation service who have been working on the Roosevelt dam, or surveying the watershed of the upper Salt river. A photograph taken in the late afternoon, from any high point on the Globe road above Livingstone, would show the remarkable castle-like appearance of this great red dyke, which may have been the Chichilticalli of the Spanish pioneers.

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CHANGES IN THE YELLOWSTONE PARK.

BY

DR. ROLAND DWIGHT GRANT.

Numerous items have come to my attention referring to the changes in the Yellowstone Park.

The claim is made that there is a decline in the forces that constitute the Park what it is, and that this looks toward the dying of the geysers. Some even urge us to see the Park quickly, for fear these wonders cease. I surely urge all to see the Park and live, rather than "Naples and die." This is not because the Park is dying, but because men may die before they see it.

Before railroads reached the Park it was my good fortune to visit the region by coach and saddle. I then became intensely interested in all the strange features that mark this as the most remarkable place on earth. I then examined many of the wonders that lie outside of the strict limits of the reserve. Since then I have often visited the Park in its entire circuit, each time with deeper interest; and have also by special request done some classifying of the geysers.

I venture some description of actual changes taking place and of their possible bearing on the future of the Park.

ENDLESS BOILING-POINTS.—Over the entire area there are endless small boiling-points, or fumaroles, extending for at least one hundred miles from a given centre. These sputter and bubble away with slight change of opening from year to year. Some trifling external cause may vary these a little, while occasionally one seems to dry up and go out of action. But even this apparent loss is often but the result of a dry coating of mud, forming too heavy a crust for the slight force to penetrate; and it is not uncommon to hear the baby geyser with smothered voice still chirping beneath the surface. Indeed, the most striking impression made is that of uniformity as to a given action.

In the natural construction department, as where the thermal springs are constructing terraces, it is plain to be seen that there must come points at which that process ceases—ceases for the simple reason that the work at that point is finished, when the processes turn to duplicate the formation in a new direction. This is evident all about the region, as seemingly a large portion of these elevations

has been so constructed. This is doubtless true of the Bad Lands of Dakota and Wyoming. All of this speaks not of visibly dying energy, but of the limits of that energy and of its uniform support up to the point of that limit. It is changes of this sort that have led to the outcry as to the dying Park.

ILLUSTRATIONS.—In 1888 Minerva Terrace was very beautiful and rich in colour, as it was then very active, and the hot-water flow abundant. A year later the charming colour was all gone from this lovely terrace. We then mourned the apparent death of this goddess. A careful survey of the field showed that while here was a striking change, it was not of energy. Instead of the loss of energy, the current had been diverted in another direction and was now evidently giving its flow to Cleopatra Pool, a little to the north, whose terraces in turn were being freshly coloured; for this north terrace had never been seen so richly active or beautiful by this writer at any other time. To our great delight, the next season the pools of the Minerva were again overflowing the brim; the current, however, was not sufficient to give colour to the entire terrace, but only to the quarter toward the pulpit. But the colour was spreading with returning increase of the water-flow, while the north pool was consequently losing its water and beauty.

THE RICH COLOURINGS.—It must be remembered that all these rich colourings depend on the continual flow of this scalding water. When the water ceases, then decrepitude begins immediately, and colour fades directly.

The colours are produced by the acids, realgar, orpiments and various oxides, as well as by the possible fungous growth in the waters.

HOW IT IS DONE.—Another place to observe is that of the most delicate Angel Terrace. Between my visits of 1899 and 1900, this bewitching terrace-well became entirely dry and the colours were all gone, leaving a deathly white mass of crackling calcium, that looked like slaking lime. I pushed on through the bushes, only to find that the current's flow had been altered, and that an entirely new terrace was now being formed a hundred feet below. Really a new Angel, and you may expect its colouring to be similar to the older terrace, for the same chemical processes are creating it. It was also observable that this new terrace had formed with great rapidity. This was caused by the fresh breaking up of the lower incrustations and the running of the hot stream in these new and fresh channels. This newly fractured surface, yielding more rapidly

to the intensely thermal water, was thus supplying material for building more rapidly. These water currents running a long time over the same old surfaces gradually exhaust the calcium deposits, and they also form slight silicic surfaces on their throats that yield little new material. Hence, they build more and more slowly above, until some new fractures below give fresh material to the terrace-building water.

This is plain when we remember that these very hot waters dissolve the calcareous rocks below, and, being forced upward to a vent, bearing calcium carbonate in solution, when it reaches the surface air the already loaded water now absorbs carbon-dioxide, and so becomes overloaded and liberates the calcium to be again deposited in the formation of the beautiful upper terraces.

At Mammoth Hot Springs.—These two cases are characteristic of other external changes manifest at Mammoth Hot Springs, but there has been no slackening of energy here for twenty-seven known years. There are no geysers at this point, they being found twenty miles further up the Park. Here at the Mammoth Hot Springs are chiefly vents of hot water, and hot air, and large scalding pools of azure-blue water in charming terraced basins of calcium.

The Great Geysers.—Reference is often made to the supposed extinct Excelsior Geyser as evidence of this dying force. I venture to suggest that its later eruptions have rather been so very excessive that its throat has become seriously enlarged, until an equal force, that once would have thrown a smaller stream to an enormous height, is not sufficient to carry the enlarged weight; at least, not so often.

On February 21, 1891, this enormous geyser was reported as playing again, after eleven-years' silence, and it was said also that a new geyser had broken out near the small fountain. But, on thorough investigation I found the report overdrawn and misleading, having been sent out by some winter wanderer for excitement.

The Excelsior eruptions have been very extensive, for its great volume of hot water was always sufficient to melt the ice and kill the fish for over two miles in Fire Hole River.

As an illustration of a geyser, you are to think of a rubber hose, the size of whose nozzle determines the distance to which it will throw a stream; while with a clearly defined nozzle removed the stream will only fall lifelessly from the open end of the rubber pipe. So it may prove later that some of the apparently dead geysers are not dead, or quiet, because of lesser force, but because of less clearly

defined throats, thus demanding *greater* force, which they do not possess. As a matter of fact, some of these geysers do in time actually mend their throats or pipes and then begin again to play. The Grand Geyser is a case of this kind, as, after a long rest, it was doing business again at the old stand in 1891, as Mr. Howe, the observant keeper at the upper basin, told me, though I just missed seeing it play.

Doubtless, many of the hot pools are former geysers whose currents are now temporarily directed to other openings. These new openings may be so large even as to produce only quiet flowing streams, entirely unobserved; or they may be directed in internal currents mingling far below, to rise again, or not. These pools may, any of them, begin playing at any time, for we have seen that they are not silent because of lesser energy, but of energy directed into other channels. Some of these mend their broken pipes more quickly than others, from various causes, like that of the presence of more or less free silica in the water.

The Changing Geysers.—The Fountain Geyser broke our hearts by becoming irregular in 1899. Another geyser burst out not a hundred feet away and ran a very brilliant but irregular career for a short season. But the sum total of its force was so nearly equal to that of the old Fountain in a given time, that it was easy to determine their relation, there not being sufficient force or water to run two simultaneously. The new geyser threw its triple streams farther than the old, but with smaller proportions, because its three exits were smaller. There is no doubt that a break had taken place below in the pipe of the old geyser, and the current was firing from a smaller nozzle, and hence more brilliant.

Some hastened to write for the press that the Fountain Geyser was dead and the Park would soon be extinct. Other interested parties printed it abroad that a new and glorious geyser had broken out, and wanted to give it some political name, which I think would have been fitting, because of its fickleness. Neither party was correct, as it was the same thermal force, and in 1900 I saw Fountain Geyser playing again with its old regularity and undiminished glory, as Nature's plumbers had mended her broken pipes.

A Striking Case.—The Black Growler is another striking case. This is a half cone three feet in diameter, four feet high. Through this cone an enormous amount of apparently superheated steam rushes continuously with such tremendous force as to produce a roaring gong that can be heard two miles. All at once a series of

very small vents broke out of the crust in front of it, and soon the single growler became silent. In its place some thirty little whistlers kept up their noise. But the sum total of the many was equal to the larger one now ceased. Moreover, there had been developing another growler some hundred feet northward. I do not believe the new one has anything to do with the old one; rather it is an independent steam geyser reversing the experience of the Old Growler, in that a group of whistlers have gracefully built a strong united silicated throat, and so broken up the partition between themselves, forming thus a vast combine. The many whistlers are thus making now one huge "trust," which by and by becomes so vast it breaks to pieces by its own force, and returns again to the many. I presume these two steam geysers are thus playing back and forth between one large opening and many small ones.

I had a fine chance that season to study the cone of the Old Growler, as but little steam was then emitted. It has a fine sounding-board of silicious sinter, and prettily lined with a species of white porcelain of various tints. This Old Growler is now receiving its former strength from the many little whistlers that will later give their steam again to the large opening. They in time will be filled over with sinter or geyserite.

These few illustrations suffice to demonstrate that each geyser and fumarole on this vast solfatara has its individual silicified tube to its own origin. For a common origin would give a common level at the surface.

It must also show that these later forces of volcanic periods are not materially changing in energy, and that centuries may pass before any real force may exhaust itself; perhaps never, and this may be earth's perpetual vent. It is at least God's workshop, where He is doing the last work in forming the earth's crust by the marriage of the gases.

Let me, in conclusion, relate one remarkable convulsion that may be illustrative of how a redoubled force becomes sometimes evident, or how a hindered force sometimes asserts itself.

A Hideous Hole.—The mud volcano is a very hideous revelation of the Park. It is a funnel-shaped sink about 40 feet deep and 40 feet across the top. A tunnel runs southward whose upper arch is about 10 feet from the bottom of the dismal pit. Up against the top of this tunnel every second is hurled some three cartloads of odoriferous, soft, slimy, black mud. This then shoots out to the opposite side of the funnel, falling back only to be hurled up and out again forever.

This churning goes on, gradually growing thicker with accumulated mud, until the vent becomes choked, as it did a few years ago. Then there came a fearful explosion, when the huge monster threw up and out the whole mass, and threw it, as I judge, for 150 feet, plastering thus the stumps and trees with the black vomit. This awful mud was so sticky that it adhered to the trees from top to bottom for, surely, several months, and they looked sick indeed. It was really a hideous sight.

I met some one who told me the Mud Geyser was much "changed." He evidently had simply observed that it was now playing with muddy water not so dense as before; but he had failed to observe the mud on the trees and the surrounding earth, which would have led him to note that its force was not only well sustained but for once seemingly overdone. Indeed, it was no evidence of change, but a part of the programme, as the clock ticks every second, striking at given periods of an hour, and the strike does not betoken change, but regularity of longer intervals, some seconds, some hours. So ever go on these changes in the Park, that are no changes at all, but periods that are marked by wonderful regularity, endless variety.

No man can say that he has visited earth's greatest wonder until he has made at least one complete tour of the Yellowstone National Park. It can be made with perfect ease, and for a very modest expense. It is the nearest to Nature's heart you can possibly get.

GEOGRAPHICAL RECORD.

AFRICA.

LAKE CHAD.—In a recent address, entitled *From the Niger to the Nile* (Scot. Geogr. Mag., Jan., 1908), Lieut. Boyd-Alexander noted the supposed decrease in the area of Lake Chad. It is his opinion that the lake does not alter much in size, and that the supposed greater original area is due partly to inaccurate surveying and partly to the fact that certain villages are several miles distant from the lake, giving the impression that they were formerly on the shore line. The position of these villages Lieut. Boyd-Alexander believes to be due to the danger of flooding during the blowing of the Harmattan, which causes the water to flow 600 yards over the land with an ordinary wind, and drives it as far as two miles when the wind is strong. Where there are good banks, and where the water is not influenced by the prevailing winds, there are many villages close to the lake. A chain of islands, once separate and now more or less joined by a marsh, has also given the impression of increasing aridity, but this change may

very likely be due to the silting of mud and sand against the obstruction of the islands by the opposing influences of the Yo and the Shari, the two rivers that feed the lake. R. DEC. W.

METEOROLOGICAL WORK IN SOUTHERN NIGERIA.—For some months past, Mr. C. Fitzhugh Talman, assistant librarian of the Weather Bureau in Washington, has published in the *Monthly Weather Review* a series of short articles dealing with the history and the present status of meteorological observations in a good many of the more remote and climatically less known countries of the world. One of the most useful features of these discussions is the maps which have accompanied them, showing the locations of the meteorological stations in the different countries. The October *Monthly Weather Review* (1907) contains an account of the *Meteorological Stations in Southern Nigeria.* The work in Southern Nigeria is under the direction of the Department of Surveys, with headquarters at Lagos. There are now 36 meteorological stations in the colony. The Lagos Observatory, which is the principal station, is well equipped with standard instruments. The remaining stations, of the second class, have maximum and minimum thermometers, ordinary thermometers and rain gauges. Observations are made twice daily at Lagos; once daily (9 A. M.) at the other stations. R. DEC. W.

RAINFALL OF GERMAN SOUTHWEST AFRICA.—All available rainfall data for German Southwest Africa have been collected, reduced and charted by Dr. Emil Ottweiler (*Die Niederschlagsverhältnisse von Deutsch-Südwestafrika,* Danckelmann's Mitteilungen aus den Deutschen Schutzgebieten, XX, Pt. I., Berlin, 1907, pp. 84). December, 1882, marks the establishment of the first rain-gauge, at Omaruru, in Damaraland, but few stations came into existence before 1890. There are now somewhat less than 100. Almost all of the rainfall comes in late spring, summer and early autumn, *i. e.,* from October to March. Hence Dr. Ottweiler has very wisely taken the year as running from July to June, thus keeping the rainfall of each season undivided. In the tables the different seasons are distinguished by washes of different colors, *e. g.,* the winter months are blue; the spring months, brown, and the summer months red. A rainfall map, and diagrams accompany the report. Along the coast the rainfall is less than 2 inches a year. It reaches 10 inches at a distance of about 150 miles inland.

R. DEC. W.

AMERICA.

THE ROCK BED OF THE HUDSON RIVER.—One of the greatest problems in the construction of the aqueduct that is to bring 500,000,000 gallons of water a day from reservoirs in the Catskill Mountains to New York City, is that of crossing the Hudson River. The original plan was a tunnel under the river at Cornwall, fifty miles above New York, the tunnel to be driven from vertical shafts, sunk in Mts. Storm King and Breakneck and to be over half a mile long.

The results of drilling in the bed of the Hudson to ascertain the character of the ground and the depth to bed rock have been surprising. Although the greatest depth of water is less than 100 feet, the rock bottom is found to descend abruptly beneath a mass of mud and sand boulders and a drill hole in the middle of the river has failed to reach bed rock at a depth of 580 feet. Professor

W. O. Crosby, who is studying the geological problems connected with the work, believes that the lowest point of the rock floor of the Hudson River Valley opposite Storm King must be about 650 feet below the surface of the river. The 17-foot circular concrete tube which will carry the water under the Hudson must be in bed rock in order to support the pressure and it will therefore be necessary to sink shafts nearly 1,000 feet below grade level of the aqueduct in order to pass under the river in solid rock.

Drill holes in the Moodna Creek valley, west of Cornwall, show that the creek flows on top of a thick deposit of sand and gravel filling a deep U-shaped rock valley. This ancient buried topography under the sand and gravel deposit may necessitate the construction of a single, inverted syphon, three or four miles long, to go under both the Moodna and Hudson Valleys, instead of one under the Hudson alone as originally contemplated. The diamond drill has revealed the strength or weakness of the rock at vital points and details of bed-rock topography which in many places are hidden by thick glacial deposits. (Condensed from *Economic Geology*, Vol. 3, No. 3.)

Quality of the Water in the Great Lakes.—The U. S. Geological Survey has completed an investigation of the quality of water in the Great Lakes. It is found that, except along shore at times of high winds, the water in all the lakes is practically free from suspended matter of any kind. The water of Lake Superior contains the least amount of dissolved solids; that of the Lake Huron outlet, including water derived from lakes Superior, Michigan, and Huron, ranks next. Lake Michigan is third with about twice as much dissolved matter as Lake Superior. Lake Ontario is a trifle more highly mineralized than Lake Erie and contains two and a quarter times as much dissolved matter as Lake Superior water. It was found that 3,350,000 pounds of dissolved minerals pass out of Lake Ontario each year. Of this great quantity, 441,000 pounds come from Lake Superior, 666,000 pounds from Lake Michigan, 913,000 pounds from Lake Huron, 840,000 pounds from Lake Erie, and 490,000 pounds from Lake Ontario. The drainage area of Lake Erie contributes far more than its proportionate share to the total mineral matter.

Solar Radiation and Terrestrial Climate.—The *Annals* of the Astrophysical Observatory of the Smithsonian Institution, Vol. 2, has just appeared. This second report is published eight years after the first was issued. It contains 245 quarto pages, with many tables and diagrams of the observational results. The careful and comparable measurements of the solar variation here recorded extend over a number of years and indicate that the sun's radiation varies in its intensity from time to time and that these variations are sufficient to affect appreciably the temperature of the earth.

The Observatory was founded in Washington through the efforts of the late Secretary Langley, who was its director until his death. He expressed the hope that careful study of the radiation of the sun might eventually lead to the discovery of means of forecasting climatic conditions for some time. Not only have researches on the relation of the sun to climate and life upon the earth been carried on at this observatory, but similar investigations have also been in progress at the Mount Wilson Observatory, Cal., since its establishment. These observatories are separated by 3,000 miles in distance and 6,000 feet in elevation.

The report gives some reason to believe that Dr. Langley's hope may in time be realized, though the investigation as yet is far from reaching the satisfactory degree of knowledge which the science of meteorology demands. The report says that from a comparison extending over thirty years of the temperatures of forty-seven stations well distributed over the land surface of the earth it appears possible that changes of solar radiation do produce, not infrequently, well-marked and recognizable changes of temperature over the continental areas of the world. Such changes of temperature would be predictable if accurate measurements of the solar variation were systematically continued at a few favorable stations.

Proof is adduced that the surface of the earth radiates very slightly through space on account of the interference of clouds and water vapour with terrestrial radiation. The substance which maintains the earth at nearly constant temperature by emitting to space radiation about equal to that received from the sun is the layer of water vapour at 13,000 to 16,000 feet of elevation.

SURFACE WATER SUPPLY OF THE GREAT BASIN.—Water Supply Paper, No, 212, gives the results of the hydrographic study of the Great Basin in 1906. After a geographical description of the region its drainage is divided for convenience of treatment into four areas, viz., Wasatch Mountains, Humboldt Sink, Sierra Nevada, and Great Basin Drainage in Oregon. The amount of water available for storage at possible reservoir sites, and also for use in various canal systems in operation or projected is shown.

PETROLEUM IN 1906.—The production of petroleum in the United States in 1906 was 126,493,936 barrels, worth $92,444,735. This output from the five great fields was distributed as follows: Appalachian field, 27,741,473 barrels; Lima-Indiana-Illinois field, 21,951,711 barrels; Mid-Continent field, 21,718,648 barrels; Gulf field, 21,645,425 barrels; California field, 33,098,598 barrels; and from scattered States and areas, chiefly Colorado and Wyoming, 338,082 barrels.

California, the largest producer, supplied nearly one-fourth of the total output and still holds first place as to quantity, while Kansas, Indian Territory and Oklahoma together hold second place. The greater part of the oil from the California and Gulf fields is consumed as fuel, but only a small proportion of that produced in other fields is so utilized. The most important features of the petroleum industry in 1906, as summarized by Mr. W. T. Griswold of the U. S. Geological Survey, are:

1. The extension in area and the increased daily production of oil in the Mid-Continent field.
2. The expansion of the area in Illinois from which oil is being produced, from its original discovery near Casey southeastward into Lawrence County.
3. The growth of the consumption of fuel oil in California, which in 1906 exceeded the total production of the State for the year.
4. The falling off in production of the pools of the Coastal Plain district of the Gulf States.
5. The continued decrease in the average daily production from the Appalachian field.
6. The laying of the second pipe line from the Mid-Continent field to Whiting, Ind., and the building of a pipe line across the Isthmus of Panama for the delivery of oil from the California field to the Atlantic Ocean.

ORIGIN OF WESTERN PLACE NAMES.—The Chicago and Northwest Railroad system has sent to the Society a volume of 202 pp., containing many hundreds of place names of Western towns through which the lines of that railroad pass,

arranged alphabetically and each accompanied by a concise statement of the origin of these place names. The information was collected by an officer of the system and the compilation shows much care.

THE FALLS OF NIAGARA.—The Geological Survey of Canada has published the report of Dr. J. W. W. Spencer on the special surveys and studies made for that Government relating to the origin and history of some features of the Niagara Falls region. His report, entitled "The Falls of Niagara—their Evolution and varying Relations to the Great Lakes; Characteristics of the Power and the Effects of Its Diversion"—is rich in information. Dr. Robert Bell, Director of the Geological Survey, having commissioned Dr. Spencer in 1904 to prepare a monograph upon the Falls, the Survey was begun in June, 1905, and the field work was completed in October, 1906. The investigations included soundings in the gorge, the whirlpool and even under the Falls themselves; borings to ascertain the character of the buried channel beds over which the river flowed; instrumental surveys of the old river banks and the position of the strata; and the study of lake fluctuations and meteorological changes. The unexpected depth of 192 feet was found underneath the Canadian Fall. The soundings were ingeniously carried out with the result that the shape of the entire gorge is more accurately known now than heretofore.

The investigation of the form of the gorge and the structure of its rock sides and bed gave data for a recalculation of the rate of recession. Dr. Spencer finds that the mean rate of retreat for the Canadian Fall from 1842 to 1905 was 4.2 feet annually; and about .6 of a foot annually for the American Fall. The rate of recession in future will be less, partly on account of the large quantity of water diverted for power purposes.

After analyzing the components which have affected the recession of Niagara Falls, Dr. Spencer tells the story of their retreat and gives his conclusions as to their approximate age.

He says the Fall at first was only thirty-five feet high with a volume of 15 per cent. of the present Falls. Receding a short distance, the height increased and the Fall was separated into two cataracts. The time required for the recession of the double Falls to Wilson Point was 31,600 years in addition to 3,200 years during the earliest stage of recession; and 700 years more to the head of Foster flats, the whole distance being nearly three miles. "This was the length of the gorge excavated during the Erie Epoch. From now onward the recession was very rapid, modified at times, but in all requiring only about 3,500 years, so that the age of Niagara Falls may be placed at about 39,000 years. Slight variations on one side or the other are probable, but, under the conditions all of which are now apparently known, the error in calculations will not exceed 10 per cent."

The book is finely illustrated with half-tone photographs and maps.

CANADIAN GEOLOGICAL SURVEY.—In the recent reorganization of the Canadian Geological Survey, the geologists and the Government engineers are grouped in a single but divided organization. At the head of the mining and geological activities is the Minister of Mines, that office now being occupied by Mr. Templeman. The executive head under him is the Deputy Minister of Mines, which position is filled by Mr. Low, though, on account of ill health, he is absent on

leave. The two distinct branches are the Mines branch, of which Dr. Howell is the Director, and the Geological Survey, of which Mr. Low is Director and, during his illness, Mr. R. W. Brock is acting Director.

RAINFALL OF CENTRAL AMERICA.—Dr. Alfred Merz has prepared a discussion and map of the rainfall of the Panama Canal region and the adjacent parts of Central America, using the data collected in connection with the construction of the canal (*Beiträge zur Klimatologie und Hydrographie Mittelamerikas,* Leipzig, C. G. Naumann). The isohyetal lines show a range from 1 meter to 6 meters.

R. DEC. W.

CLIMATOLOGY OF LA PAZ.—Victor E. Marchant, chief of the section of Climatology and Agricultural Exploration of the Ministry of Agriculture in Bolivia, has prepared a report on the climatology of La Paz (*Estudio sobre la Climatología de La Paz,* La Paz, Pp. 48. Pls.). The means are based on a period of less than 10 years. The mean annual temperature is 50.4° F. The coldest months are June and July, with 45.3°; the warmest are November and March, with 53.9° and 54.7° respectively. The absolute extremes were 75.2° (January, 1903), and 26.6° (June, 1901). The rainfall varied from 15.88 inches in 1901 to 32.84 inches in 1903.

R. DEC. W.

ASIA.

ASCENT OF MOUNT KABRU.—The recent bold and successful ascent to the summit crest of Kabru in the eastern Himalayas has been noticed in the newspaper press. The *Alpine Journal* (Feb., 1908) gives further details. The ascent was made by two Norwegians, Mr. Rubenson and Mr. Monrad-Aas, in October last. They approached Kabru on the southwest side, and at about 16,000 feet reached the actual foot of the mountain. Here they started on the climb with a week's provisions and fourteen picked coolies. Up to 19,500 feet the ice and snow presented no great difficulty and a second camp was established at this point.

From this camp to the next, five days of step-cutting up the ice slope were required. The coolies, after being trained to use the ice-axe and rope, proved excellent mountaineers. The third camp was formed on a small flat where the party rested two days. The route above Camp 3 was not so difficult as the ice work above Camp 2, but blocks falling from the high ice wall on the left necessitated constant vigilance. Still higher, enormous crevasses in the ice were crossed with some difficulty. The elevation of the next camp was computed to be about 21,500 feet above sea-level.

From this point the Norwegians decided to make the final attempt for the summit; but when they topped the ridge between the "Dome" (marked on Freshfield's map as a peak just in front of Kabru) and the northeast peak of Kabru, they found that they would not have time to climb to the summit and descend safely the same day. They therefore deferred the attempt to another day and returned to camp.

Next day the camp was brought up to the point reached the day before, and the night was passed at about 22,000 feet. The cold was intense, the thermometer registering −29°C. All the coolies were sent back to the lowest camp excepting two, who were huddled with the Norwegians in one small tent.

On Oct. 20, the final attempt to reach the summit was made. The cold was so great and the wind so high that it was very unpleasant and difficult to walk. The four slowly advanced, cutting steps in the hard snow and stopping, now and then, to look after their feet, which were near freezing. At about 5 P. M. they felt sure that the summit was just above them and, at 6 o'clock they reached what was thought to be the top, till they saw a low snow ridge, some fifty or sixty feet higher, which they were certain was the actual summit. The sun had set, the descent was rather dangerous and difficult, and they did not dare to go on, as it would have meant death to spend the night at that altitude. They were thus compelled to turn back.

The altitude reached was about 22,900 feet, the highest on record. The two peaks of Kabru do not vary much as to height, but Mr. Rubenson believes that the southwest peak is a trifle the higher. It is marked on the map as 24,015 feet.

Kabru stands a little west of Kangchenjunga, now classed as second among the high summits of the Himalayas. The expedition had spent over a fortnight on the ice. Neither of the Europeans suffered severely from the mountain sickness, but some of their coolies were badly affected, while others did not mind the high altitude. Mr. Rubenson thinks it is possible to climb much higher mountains than Kabru.

Coal Resources of North China.—Mr. Bailey Willis, of the U. S. Geological Survey, has written a paper on "The Mineral Resources of China," in which he expresses the conviction that Baron von Richthofen's estimate of China's coal resources was excessive. In his opinion China already has need for all the coal that she can mine to the depth permitted by Chinese methods; and when the Empire develops her industries, he thinks that the capacity of all the coal mines will be taxed to supply the home demand. Believing that her need for coal will be enormous, he does not think the country will be able to export the commodity.

Analyzing the results of the studies by von Richthofen, Pumpelly, and Drake, as to the coal resources of north China, he roughly estimates that the total amount of coal in that part of the empire is 605,000,000,000 tons, which may be 1,000,000,000 tons more or less out of the way. There are large coal areas also in south China, but, as far as is yet known, the greater part of the coal reserves of the Empire is in the northern fields, and Mr. Willis's estimate of their content is 45,000,000,000 tons less than our Government estimate of the total amount of coal in our Appalachian fields.

These views may tend to modify our earlier conception of China as a coal reserve for Europe and America when our reserves shall run low. They will be subject, however, to important changes when more exact knowledge shall be gained of all the Chinese coal areas.

A New Mammoth Expedition.—The Imperial Russian Academy in February despatched an expedition to the mouth of the Yana River, Siberia, to secure the body of the mammoth unearthed there last year and transport it to St. Petersburg. The leader of the party is the geologist K. A. Wolossowicz, known for his participation in the polar expedition of the late Baron Toll. His chief assistant is the zoologist E. W. Pfizenmaier, who helped to recover the remains of the mammoth found in 1901 on the Kolyma River. The skeleton of this specimen covered with its stuffed hide, is now the most conspicuous object in the Zoological Museum of the St. Petersburg Academy.

The route of the party is from Irkutsk down the Lena to Yakutsk, across the mountains to Verkhoyansk, and down the Yana to Ustyansk, from which a further sledge journey of about 150 miles will bring the expedition to the mammoth. The prize will be carried upon sleds to Bulun on the lower Lena, whence a ship will take it up the Lena to the Siberian Railroad. Wolossowicz will remain behind to study the geological conditions near the mouths of the Indigirka and Kolyma rivers. He is likely also to visit the New Siberian Islands. (*Petermanns Mitt.*, 1908, No. 3.)

Dr. Merzbacher's New Explorations in the Tian-Shan.—A letter from Dr. Merzbacher, dated "Kulja, Feb. 9, 1908," to the *Geog. Jour.* for April describes the purposes of his third journey into the Tian-Shan Mountains and the results of his latest studies. It was his opinion that his earlier observations, copious as they were, still did not supply him with an adequate basis for his investigations into the history of the more recent development of the mountains. He decided to draw within the compass of his researches the eastern parts of the Central Tian Shan. The past year was devoted chiefly to the exploration of the river systems of the two greatest mountain rivers draining the northern slope of the central Tian-Shan—Kok-Su and Agias. Their hydrographic system was investigated to their highest sources, and special attention was given to the structure and composition of the mountains and the causes of the peculiar valley formation. These two river regions in extent fall short of the glaciers of the great longitudinal valleys, Sary-Dokhas, Inylchek, etc. The largest of them are not over 7½ to 12½ miles long, but their number and diffusion are very great. Glaciation is notable, and the total extent of territory covered by firn and ice is far larger than had been expected. Dr. Merzbacher intended to start for the mountains again early in March upon the arrival of his new geological assistant, Dr. P. Groeber.

Aids to Navigation in China.—The Imperial Maritime Customs has just printed (III—Miscellaneous Series; No. 6) a list of lighthouses, light-vessels, buoys, and beacons on the coast and rivers of China, corrected to Dec. 1, 1907, and accompanied by maps showing the position and range of these lights. There are sixty river lights on the Yangtse above its mouth and fifty-four along the coast from Newchwang to Hainan.

AUSTRALASIA.

A Half-Breed Tasmanian.—Dr. Richard J. A. Berry, Professor of Anatomy in the University of Melbourne, visited Kangaroo Island, south of South Australia, early in 1907, where he found Mrs. S., a genuine half-breed Tasmanian, who was born on that island some 75 years ago as the result of the union of a white man with a native Tasmanian woman. The last Tasmanian man, William Lanney, *alias* King Billy, died March 3, 1869, aged 34. He was outlived by the woman Truganini or Lala Rookh, who died in May, 1876, aged about 73 years. With her the native Tasmanian race became finally extinct, and there now remain but a few half-breeds, of whom Mrs. S., the subject of a paper by Dr. Berry (*Proc.* of the Royal Soc. of Victoria, Vol. 20, Part 1), is perhaps the oldest.

In 1819 a white man arrived on Kangaroo Island from Tasmania bringing two aboriginal women with him, one of whom was the mother of Mrs. S. The

child was educated by the wife of the head keeper of the Cape Willoughby lighthouse, married a white man, and has one son and two daughters. Dr. Berry was impressed with her remarkable intelligence and the purity of her English speech. Her photograph, as Dr. Berry mentions, shows that she bears many striking resemblances to her aboriginal fathers as described by Bonwick, particularly in the colour of the skin, the width of the mouth and nostrils, the weak chin and the dark eyes.

The author discusses some of the debatable points in connection with the lost Tasmanian race. Many anthropologists believe that the Tasmanians were one of the oldest of peoples and that they were not a part of the aboriginal stock of Australia. Dr. Berry shares the view of Howitt and some other writers, that the Tasmanians came from the north, probably from New Guinea, and that they reached Tasmania at a time when there was land communication between it and Australia.

Tropical Agriculture in Western Australia.—The Surveyor-General of Western Australia has sent to the Society the report made by W. V. Fitzgerald on his investigation of a part of West Kimberley, the most northern division of that State. His field work was between 16° and 18° S. lat. and west of 127° E. Long. About 1,250 miles of country were examined, and Mr. Fitzgerald reports that in this district over 1,000,000 acres of land are suitable for raising tropical products. This fertile area is only a small part of similar country in the Kimberleys. Possibly some of the numerous islands near the northern coast will be found suitable for the cultivation of the cocoanut palm on a large scale.

EUROPE.

Disappearance of Lake Märjelen.—All who have made the ascent of the Eggishorn know the little Lake Märjelen, situated a little north of the mountain and hemmed in on its west side by the great glacier of Aletsch. This lake disappeared in a night in August last, and it is supposed that a crevasse opened in the Aletsch glacier on a level with the bottom of the lake, and the sheet of water was quickly drained. Much damage was done to the lands of the peasantry in the valley below the glacier. The lake has similarly disappeared on several occasions during the past century, and in 1888 a dam was built along its western edge to prevent such disasters. There was no sinking of the lake till last summer, and it is believed that the dam became undermined, giving the water a chance to escape as in earlier years.

The Dispersal of Fog.—At the request of the London County Council, Dr. W. N. Shaw, Director of the British Meteorological Office, has recently looked into and reported upon certain proposals made by one Demetrius Maggiora, "to prevent the formation of fog, or to disperse it in case it is already formed, and also to disperse and destroy all clouds, and to prevent rain, hail-storms, lightning and thunder." From Dr. Shaw's report, the following is taken:

The apparatus which Signor Maggiora now offers for removing London fog is apparently on similar lines to that supplied in Italy for dispersing hail-storms. From the scientific point of view hail forms a much more specious opportunity for human interference than fog. The atmosphere is then in a state of great commotion preceded by abnormally unstable conditions. A London fog is

incidental to conditions of unusual stability, and Signor Maggiora's memorandum suggests no physical process which could produce any effect in accordance with the known physical properties of the atmosphere.

It may be remarked that the weight of a cubic mile of air is about five million tons, and consequently the weight of fog-laden air, in the case of a fog a mile thick extending over the district of greater London alone, is 3,000 million tons. It is obviously useless to attempt the motion of so great a mass by mechanical action. . . .

I may sum up by saying that the claim to prevent or disperse fog is entirely unsupported by any evidence. The claim to prevent rain is opposed by the more frequent claim of similar processes to produce rain in countries which suffer from drought, and the claim to affect hail-storms (which is associated with that regarding thunder and lightning) is not allowed by the scientific experts of Austria and Italy who have conducted special investigations on the subject for their respective Governments.

The Public Control Committee, which had this matter in charge, made a report to the London County Council, after hearing Dr. Shaw's report, to the following effect:

That the Main Drainage Committee be authorized to allow Signor D. Maggiora the use of a site, on land held for main drainage purposes, in order to enable him to conduct experiments with his apparatus for the prevention and dispersal of fog, and that the grant of any such facilities to Signor Maggiora shall be made on the distinct understanding that the experiments are not being carried out under the direction of the Council, and that the name of the Council shall not be used in any way in connection with any application for financial aid for working the invention.

R. DEC. W.

RAINFALL OF THE LIGURIAN RIVIERA.—Dr. Eredia, of the Italian Central Meteorological Office, discusses the rainfall of the Ligurian Riviera in the *Rivista Agraria* for October, 1907. All reliable rainfall data for the district have been collected, and tabulated, and critically studied. The rainfall along the eastern Riviera is heavier at all seasons than that along the western. Autumn is the wettest and summer the driest period. Next to the autumn maximum, the winter is wettest at Genoa, San Remo and Spezia, *i. e.*, near the centre and the extremes of the province. The mean annual rainfalls are 52.8 inches at Genoa, 57.7 inches at Spezia, and 31.9 inches at San Remo. The period covers 1880-1905.

R. DEC.W.

A RAILWAY WIND-GAUGE.—About four years ago a wind-gauge was erected near Ulverston, in England, to protect trains from risk in traversing an exposed viaduct. In a recent number of *The Railway Magazine* (October, 1907), a description of this instrument is given. The apparatus is fixed at the west end of the Levens viaduct, and its actuating part consists of two boards, kept in a vertical position by springs, and the movements of which are shown by means of the customary pen and clockwork appliances. A pen is operated by either board according to the direction of the wind, and for greater exactitude of time, the chart paper, over 65 feet long, is perforated, the holes in the paper corresponding with studs in a clock-work wheel. When the wind-pressure reaches 32 lbs. to the square foot, the spring boards referred to are adjusted to make an electrical contact, ringing bells in the signal cabins on either side of the viaduct. When this occurs, all trains are detained until the force of the wind moderates, any such interruption being telegraphed to the superintendent of the line. The apparatus is tested weekly. It has been at work since September, 1903. In February, 1907, a velocity equivalent to 65 miles an hour was recorded.

R. DEC. W.

GEOGRAPHICAL FIELD STUDY IN EUROPE.—Professor W. M. Davis, of Harvard University, who started for Europe in April, proposes to spend June and most of July in northern Italy and the Alps studying certain geographical problems. He hopes to have associated with him a number of advanced students, already somewhat practiced in field study. The districts proposed for examination are in the foothills of the Apennines near Ancona, the non-glaciated valleys of the Apennines near Faenza, the basin of Florence, the Mediterranean coast between Pisa and Spezia, Spezia and Genoa and west of Genoa, the divide between the Mediterranean streams and the headwaters of the Po, and glaciated and non-glaciated valleys of lake basins in the Alps (Como, Lugano, Maggiore), and also in the French Alps. It is desired to treat the various problems in accordance with the methods of systematic physiography.

AGRICULTURE AND LIVE STOCK IN SCHLESWIG-HOLSTEIN.—The Agricultural Bureau of the province of Schleswig-Holstein publishes in two handsome volumes, "Bodenanbau und Viehstand in Schleswig-Holstein," Parts 1 and 2, a very thorough compilation by Mr. Th. H. Engelbrecht, based upon official statistics and relating to the conditions and distribution of the agricultural and live-stock industries in this northwestern province of Prussia. Part 2 (233 pp.), published at Kiel in 1905, gives a systematic tabulation of the facts, and is a good example of the minute analysis which the Germans bring to bear upon all elements of productivity and the resulting output. The percentage of the total area, for example, given to the various cultivated crops, in each small district, in the larger political divisions and in the province as a whole, is given for 1900, with comparative figures of area, yield, etc., at earlier enumerations. Part 1 (307 pp.), published in 1907, contains an exhaustive discussion of these tables, including a study of the various influences, as precipitation and soil varieties, that affected the results. Six sketch maps in colours give a graphic representation of the distribution of soils, farm lands, and crops.

POLAR.

MR. STEFANSSON RETURNS TO THE ARCTIC.—Mr. V. Stefansson, the ethnologist, left New York in April to resume his studies among the Eskimo of the Canadian Arctic coast and the neighbouring islands. His programme has been fully outlined in the BULLETIN (March, 1908, pp. 174-5), excepting the fact that he is accompanied by Captain Rudolph M. Anderson, who goes as his assistant to carry on zoological investigations for the American Museum of Natural History. Captain Anderson is the author of a large work on the birds of Iowa, a graduate of the University of Iowa and a Ph.D. in zoology. The party left Edmonton, Alberta, on May 21, to descend the Mackenzie.

KNUD RASMUSSEN'S NEW WORK.—Knud Rasmussen, the Danish ethnologist, whose book "Neue Menschen," in which he describes the Cape York Eskimo, has attracted considerable attention, left Upernivik, the most northerly settlement in Danish West Greenland, in the spring of 1907, to make a second visit to these natives for the further study of the people and their language. Later, accompanied by a single Eskimo, he started on a journey through Ellesmere Land and North Devon to visit the Baffin Land natives and begin his ethnological studies among these and other Eskimo groups.

MR. SHACKLETON'S ANTARCTIC EXPEDITION.—The *Geog. Journal* for April gives some further particulars of the landing of the Shackleton expedition now wintering in the Antarctic. The *Nimrod*, which took the party to its Antarctic camp, was badly strained during the storms encountered after the expedition left Lyttelton, N. Z., and members of the scientific staff as well as the crew had to take their turn at the pumps. The steamer *Koonya* towed the *Nimrod* till ice was sighted on Jan. 15. After her departure the course of the *Nimrod* was directed south along the 178th meridian of W. Long. For several hours on Jan. 16, the vessel threaded her way among large icebergs, but the open waters of Ross Sea were reached without any sign of the pack ice, through which earlier expeditions had to force a passage.

The Ice Barrier was sighted on Jan. 22, and the expedition then turned eastward to carry out Shackleton's intention of establishing winter quarters on King Edward VII Land. He reports, however, that access to the land in this direction was barred by the ice. Repeated spells of bad weather were experienced, and at last he decided to make for McMurdo Sound at the west end of the Ice Barrier. Here winter quarters were established on Cape Royds under the shadow of Mount Erebus, about 20 miles north of the *Discovery's* winter quarters. The landing of the motor car, ponies, dogs, and other equipment was accomplished with some difficulty, and on one occasion the *Nimrod* was blown out to sea in a blizzard with a temperature of 16° Fahr. below zero.

The landing party appears to be fifteen strong, having been joined by Prof. David, of Sydney, Mr. Marson, a chemist and physician of Adelaide, and Mr. Armytage, a hunter and traveller of Melbourne. Since the *Discovery* expedition, the region around McMurdo Sound is not virgin territory in the same sense as is King Edward VII Land, but there is plenty of room for good scientific work, and no doubt a great effort will be made to reach the pole. The *Nimrod* is to return for the explorers early in 1909. It is reported that Captain England has resigned his command, and, according to a telegram from Wellington, it is doubtful whether the magnetic survey in the Indian Ocean which was allotted as the work of the *Nimrod* during the coming year will be undertaken.

VARIOUS.

THE ROYAL GEOGRAPHICAL SOCIETY AND MR. BOYNTON.—Much has been published in the newspapers about an expedition that was being organized in Boston by Mr. George Melville Boynton for a journey across South America. Mr. Boynton has been repeatedly represented as saying that his party was to go out under the auspices of the Royal Geographical Society. The April number of the *Geog. Journal* prints a note from the Council of that Society declaring that it has nothing whatever to do with the expedition, and adding that the Council has no means of forming an opinion on the organization or objects of the expedition, or on the competency of its Commander.

PROF. W. H. HOBBS, of the University of Michigan, with two assistants, will make a special study of the glacial formation of the Alps during the summer.

PROF. J. B. WOODWORTH, of Harvard University, will take charge of the Shaler Memorial Expedition to South America, which will leave New York in

June for Rio de Janeiro and remain in Brazil until the rainy season in October. The Brazilian Government will give it special facilities. After leaving Brazil, Prof. Woodworth intends to investigate shore-line changes along the coast of Chile.

AN ADDITIONAL GRANT of £200 has been given out of the Common University Fund to the Oxford School of Geography for the present school year. The report for 1907 shows that the number of students slightly increased throughout the three terms. The equipment of the school is being constantly improved.

IN ITS UNTIRING EFFORTS to present the attractions of Sweden to tourists, the Swedish Tourist Traffic Society has compiled a small and finely illustrated handbook describing Sweden's place in history, her economic resources, social conditions and aims, educational system, her representative men of science, scientific institutions, sporting life, and art collections.

DR. GILBERT AT THE UNIVERSITY OF PENNSYLVANIA.—In presenting Grove Karl Gilbert for the honorary degree of LL.D. at the University of Pennsylvania in March, Prof. W. B. Scott of Princeton University said:

> For nearly forty years one of the most distinguished of those brilliant investigators who have adorned the successive organizations culminating in the present U. S. Geological Survey, you have enriched geology by a series of studies and contributions of striking originality and importance, which have led to new conceptions of the earth's history and opened new fields of investigation. As a pioneer in what may almost be called the American science of physiography, your work is recognized and valued the world over as being of the highest significance. Therefore, at the request of the Trustees of the University of Pennsylvania, I ask the Provost to confer upon you, Grove Kar Gilbert, the degree of doctor of laws.

ONE OF THE INTERESTING human responses to climate is brought out by Mr. Ralph H. Hess in an article, "The Passing of the Doctrine of Riparian Rights," in *The American Political Science Review* for November, 1907. The author briefly traces the development of law with respect to the use of running water for irrigation. The Roman law, developed in Italy where irrigation was useful, provided for irrigation rights. In England, a humid country, much of the Roman law was embodied in the common law, but the provisions for irrigation were not applicable or necessary and were not made a part of the common law. The common law provided with care for the rights of the navigator. On non-navigable streams the riparian owner could use the water, but he must return it to the original channel without notable diminution. The common law has, in general, spread to the humid states of North America.

When the settlers began to occupy the arid and semi-arid portions of the United States, it was found that running water had a value far beyond that for navigation and manufacturing. The specific legal response to the new conditions was the doctrine of appropriation, that is, "he who first turns aside stream or lake waters and applies them to beneficial use, was first in a right commensurate with that use." The origin of the doctrine, however, in the arid West, lay not in the use of the water for irrigation, but in its use for placer mining. The first settlers in large numbers were miners, and their practice in the use of flowing water for mining was adopted in irrigation. The new law gives the riparian land owner no special advantage in the use of the water over those whose lands

do not touch the stream. Indeed, in the use of the stream for irrigation, the land owner in another watershed may use the stream in preference to the riparian owner, provided he first acquired the right by use. Mr. Hess traces the doctrine of appropriation as applied in various States and mentions some of the problems, such as inter-State water rights, which are as yet unsolved. F. V. E.

World Diagrams of Population, Temperature, Rainfall and Plant Distribution.—A Supplement to Teachers' Geography. By Mark Jefferson, Professor of Geography in the Michigan State Normal College. Published by the author. Ypsilanti, Mich. 1908.

Professor Jefferson has put into the hands of teachers a very useful set of outline maps of the world, showing the population on a five-degree scale (very dense, dense, moderate, thin, scanty); Köppen's map of temperature zones (see this Bulletin, July, 1905); rainfall (for June, July and August; for December, January and February; and for the year), and plant regions (after Schimper). The maps are clear; the important points are well emphasized, and all unnecessary details are omitted. Well-chosen questions on each of the maps are given, in order that the student may "reproduce the facts of the diagrams in words." For laboratory work in geography these charts will prove very useful, and they will surely help to systematize instruction along these lines. R. DeC. W.

City Fog and Country Fog.—The difference between the "dry" fog of a city like London and the "wet" fog of the surrounding country has frequently been noted. A striking example of the difference between these two forms of fog is given by L. C. W. (Bonacina), in *Symons's Monthly Meteorological Magazine* for December, 1907. On November 11, 1907, at 7 P. M., a thick, dry fog prevailed in London, with pungent fumes of oxide of sulphur very noticeable. It was so dark that torches were carried in the streets and fires were placed at street junctions. Fifteen miles out of London, at 8.30 P. M., there was a fog as dense as in the city, but perfectly pure and very wet. In fact, a drizzling rain was falling. R. DeC.W.

American Geographical Society.—A Regular Meeting of the Society was held at Mendelssohn Hall, No. 119 West Fortieth Street, Tuesday, April 21, 1908, at 8.30 o'clock, P. M.

Vice-President Greenough in the chair. The following person, recommended by the Council, was elected to Fellowship:

Charles A. Clark.

The Chairman then introduced Mr. Homer B. Hulbert, who addressed the Society on Korea, Past and Present.

Stereopticon views were shown.

On motion, the Society adjourned.

The Council of the Society, at a meeting held on the 19th of March, awarded the Charles P. Daly Medal to Prof. George Davidson of the University of California.

NEW MAPS.

AFRICA.

KAMERUN.—Provisorische Karte von Teilen der Bezirke Ossidinge, Bamenda und Dschang. Scale, 1:500,000, or 7.8 statute miles to an inch. Under the direction of M. Moisel. *Mitt. aus den Deutsch. Schutzgeb.*, Vol. 20, No. 4, Berlin, 1907.

The map is based upon surveys by Captain Glauning with the use of other published and unpublished material. Embraces the region in northern Kamerun between 9° and 11° E. Long. and 5° and 8° N. Lat. Relief in brown, lakes blue, boundaries red, rivers and names black. The courses of many of the rivers have as yet been only partly determined.

CAPE OF GOOD HOPE.—Geological Map of the Colony of the Cape of Good Hope. Scale, 1:238,000, or 3.7 statute mile to an inch. Sheets XLII and LII. Geology by A. L. Du Toit. Geological Commission, Cape Town, 1908.

Sheet XLII includes the region between 28° 40° and 29° 40′ S. Lat. and 24° and 25° E. Long. Distribution of geological formations shown in colours, horizontal and inclined strata and direction of glacial striæ indicated. Geological sections or margins, with vertical scale five times the horizontal.

EAST AFRICA.—(1) Triangulationsnetz der Schlobach'schen Grenzexpedition zwischen dem Victoria-See und Zanzibar. Scale, 1:927,500, or 14.63 statute miles to an inch. (2) Die deutsch-englische Grenze zwischen dem 30 Längegrad und dem Djipe-See. Scale, 1:1,000,000, or 15.8 statute miles to an inch. Based on the surveys of the German-English Boundary Expedition. (3) Triangulationsnetz der Hermann'schen Kiwu und der Schlobach'schen Uganda-Grenzexpedition. Scale, 1:927,500, or 14.63 statute miles to an inch. *Mitt. aus den Deutsch. Schutzg.*, Vol. 20, No. 4, Berlin, 1907.

Based upon the astronomical and geodetic works carried out by the German Commission in 1902-1905 for the establishment of the boundary between German East Africa, the Congo State, and British East Africa. The sheets illustrate a summary of the report of the German Commission prepared by Prof. Dr. L. Ambronn.

EGYPT.—Scale, 1:50,000, or 0.7 statute mile to an inch. Sheets: II-I, N. E.; X-I, S. W.; X-II, S. W.; XI-I, S. W.; XI-II, S. W.; XII-I, S. W.; XII-II, S. W.; XIII-I, S. W.; XIII-II, S. W. Survey Department, Cairo, 1908. (Price, 50 mills a sheet.)

FRENCH SUDAN.—Niger Moyen. Région Lacustre. Scale, 1:1,000,000, or 15.78 statute miles to an inch. Par Lieut. Desplagnes. Émile Larose, Paris, 1907.

The map includes that part of the French Sudan south of the northern bend of the Niger between 13° and 17° N. Lat. and 1° and 6° 30′ W. Long. from Paris. It illustrates the book "Le Plateau Central Nigérien," by Lieut. Desplagnes. As his routes were numerous and long in this large region, he was able to supple-

ment the survey sheets of the French Government with many valuable data, so that his map is the best yet published of this territory. He shows in brown the extent of the Hombori Mountains and many other ranges and isolated groups and a great number of small lakes not previously mapped; also, the extent of territory flooded by the Niger and its tributaries in periods of high water.

GERMAN EAST AFRICA.—Das Ukinga-Gebirge. Based on the triangulation of Dr. Kohlschütter, and various route and plane-table surveys. Scale, 1:100,000, or 1.5 statute miles to an inch. *Mitt. aus den Deutsch. Schutzg.*, Vol. 21, No. 1, Berlin, 1908.

Land forms shown in brown, triangulation and plane-table points indicated and absolute measured and estimated heights in meters are differentiated in meters. The map accompanies a paper on the surveys of this mountain region east of Lake Nyasa.

SAHARA.—Esquisse Hypsométrique du Sahara Occidental et Central et de sa Bordure Soudanaise. Scale, 1:10,000,000, or 157.8 statute miles to an inch. By René Chudeau. *Annales de Géog.*, No. 91, Armand Colin, Paris, 1908.

A black-and-white sketch with contours for elevations of approximately 200, 500, and 1,000 meters, other heights in figures and the limits of the desert and northern limit of non-irrigated cultivation shown as well as oases, water sources, and villages. Illustrates a paper by Chudeau on the Sahara and Sudan.

SAHARA.—Itinéraire Géologique du Lieutenant Ayasse. Scale, 1:2,550,000, or 40.02 statute miles to an inch. *La Géog.*, Vol. 17, No. 2, Paris, 1908.

Illustrates an article describing the geology of the region traversed by Lieut. Ayasse from N'Guigmi on the north side of Lake Chad to Bilma. The geological formations, dry and running wells, camps, and itineraries are shown in black.

TOGO.—Togo. Scale, 1:500,000, or 7.8 statute miles to an inch. Bearbeitet von P. Sprigade. Two sheets. *Mitt. aus den Deutsch. Schutzg.*, Vol. 21, No. 1, Berlin, 1908.

A fine generalization of the information contained in the Karte von Togo, on a scale of 1:200,000, the progress of which publication has been noted from time to time in the BULLETIN.

AMERICA.

UNITED STATES.—Hawaii Territory Survey. Nine maps in the Annual *Report* of the Governor of Hawaii for 1906, Government Printing Office, Washington, 1907. They are as follows:

Hawaii, scale, 4 miles to the inch. Contours showing approximate heights with interval of 300 feet; Kahoolawe, scale, 40,000 feet to an inch; Kauai, scale, 1½ miles to an inch; Lanai, scale, 4,000 feet to an inch; Maui Co. Scale, 17 miles to an inch (this county includes Maui, Molokai, Lanai, and Kahoolawe islands and the map shows merely their relative position and triangulation stations); Maui, scale, 1:60,000, or 0.96 statute mile to an inch (originally published in 1885 and brought up to date in 1903); Molokai, scale, 1:60,000, or 0.96

statute mile to an inch; Niihau, scale, 4,000 feet to an inch (latitude and longitude by W. D. Alexander); Oahu, scale, 1⅓ miles to an inch.

The Government Survey of the kingdom of Hawaii began work in 1871 when about 15,000 separate lots and tracts of land were surveyed, mostly by loose and imperfect methods. Large parts of the islands remained unsurveyed. When the island became a part of the United States the large work was undertaken of bringing order out of this chaos. The primary purpose of the new survey was to determine the position and extent of the government lands, but its scope was enlarged in response to the public need so as to include the making of all maps, exact measurements, and records needed for public purposes.

The islands have been connected and covered by triangulation after the methods of the U. S. Coast and Geodetic Survey. The coast lines have been surveyed and satisfactory maps made of all the islands. The maps are in colours, differing in scale. The positions of all schools and post offices are indicated. Colours and symbols show the distribution and approximate extent of public lands, federal reservations, homestead-settlement tracts, forest reserves, forest areas not in reserves, sisal and sugar plantations, grazing lands, and wet lands suitable for rice and taro. The sheet for Hawaii Island is the only one showing approximate contours of elevation. Mountain regions are indicated by hachures. The maps give a good idea of the distribution of Hawaiian agricultural industries and the Survey is to be congratulated upon the results it has attained.

At the present time the most important work of the Survey Office is the laying out of lands for settlement under the existing land laws, and the locating, marking, mapping, and describing of the boundaries of the public lands and forest reservations.

UNITED STATES.—Plate I. Reconnaissance Map of Matanuska and Talkeetna Region, Alaska. Scale, 1:250,000, or 3.95 statute miles to an inch. Contour line, 200 feet. Bulletin 327, U. S. Geological Survey, Washington, 1907.

UNITED STATES.—Plate II. Geological Reconnaissance Map of Matanuska and Talkeetna Region, Alaska. Scale, 1:250,000, or 3.95 statute miles to an inch. Contour interval, 200 feet. Bulletin 327, U. S. Geological Survey, Washington, 1907.

The two plates illustrate the report by Sidney Paige and Adolph Knopf on the general geography, geology, and mineral resources of a roughly quadrangular area lying immediately northeast of the head of Cook Inlet. The territory represented by the maps embraces about 7,000 square miles. Plate I shows the topographical features which include principally the Talkeetna Mountains and the Matanuska Valley. Plate 2 shows in colours the distribution of the rocks. The principal resource thus far developed is coal, a portion of which compares favourably with Pennsylvania bituminous coal, and anthracite of good quality has also been found. As the map shows, the area of tertiary coal-bearing rocks in the Matanuska Basin is approximately 380 square miles, of which 70 square miles are actually underlain by coal.

UNITED STATES.—(1) Map of Northeastern Nebraska and Adjacent Portions of South Dakota and Iowa, showing Underground Water Conditions. Scale, 3 statute miles to an inch. By N. H. Darton, mainly from data by G. E. Condra and J. E. Todd, 1905. (2) Preliminary Geologic Map of Northeastern Nebraska.

Scale, 8 statute miles to an inch. By G. E. Condra, with adjacent portions of South Dakota and Iowa, by J. E. Todd. Prepared under direction of N. H. Darton. U. S. Geol. Survey, Water-Supply Paper 215, Washington, 1908.

These maps illustrate the study by Prof. Condra on the "Geology and Water Resources of a Portion of the Missouri River Valley in Northern Nebraska."

U. S. HYDROGRAPHIC OFFICE CHARTS.

Pilot Chart of the North Pacific Ocean, May, 1908.

Pilot Chart of the North Atlantic Ocean, May, 1908.

UNITED STATES.—Archeological Map of the Upper Gila and Salt River Valleys, Arizona and New Mexico. Scale, 18 miles to an inch. In "Antiquities of the Upper Gila and Salt River Valleys," by Walter Hough. Bureau of Amer. Ethnology, *Bull.* 35, Washington, 1907.

Shows the distribution of important and minor Pueblo ruins, walls, fortifications, cave dwellings, caves, pictographs, and shrines.

UNITED STATES.—The Adirondack Region. Scale, 24 statute miles to an inch. New York State Museum *Bulletin* 119, Albany, 1908.

A back-and-white sketch map showing the distribution of the principal geological formations and of iron ores in the Adirondacks. Illustrates a monograph on the "Geology of the Adirondack Magnetic Iron Ores," by David H. Newland.

UNITED STATES.—Map of Port Henry and Vicinity. New York State Museum *Bulletin* 119, Albany, 1908.

Parts of the Port Henry and Elizabeth, N. Y., quadrangles, on which are shown the location of the iron mines in that region, referred to in the text.

UNITED STATES.—Geologic Map of Letchworth Park, N. Y. *Bull.* 118, New York State Museum, Albany, 1908.

Three colours, showing the distribution of the shales and sandstones in this State park on both sides of the Genesee River.

CANADA.—Railway Map of the Dominion of Canada. Scale, 1:2,217,600, or 35 miles to an inch. 8 Sheets. James White, Geographer. Department of the Interior, Ottawa, 1907.

The map includes the entire Dominion excepting the northern islands of the Parry Archipelago. Fifty-seven railroads in operation, under construction, located or projected are shown, together with their sea or lake connections. Many railroad distances from Montreal, Winnipeg, and Vancouver and steamship distances to leading ports are given. The multiplicity of place names and rivers and the comparatively large scale delineation of the coasts make this work useful apart from its special excellence as a map of communications.

CANADA.—Standard topographical Map. Scale, 1:250,000, or 3.95 statute miles to an inch. Ontario, Toronto, and Muskoka sheet. Department of the Interior, Ottawa, 1907.

CHILE.—Comisión Chilena de Límites. Sheets: Antofagasta (2 sheets). Scale, 1:250,000, or 3.9 statute miles to an inch. Oficina de Límites, Santiago, 1908.

VENEZUELA.—Übersicht der Neuen Landesaufnahme im Nördlichen Venezuela. Scale, 1:1,500,000, or 23.67 statute miles to an inch. *Pet. Mitt.*, Vol. 54, No. 3, Justus Perthes, Gotha, 1908.

Illustrates an article by Prof. W. Sievers, entitled "Eine neue Karte von Venezuela." The map shows the position of towns, coast lines, etc., as fixed by the Astronomical Commission, and also the position of the same features as given on Codazzi's map, long the best map of Venezuela. As a rule, the positions in western Venezuela on the Codazzi map are in error about half a degree in latitude and a third of a degree in longitude. Sheets of the new survey have been described in the BULLETIN (1907, pp. 564-5).

ASIA.

HIMALAYA.—Garhwal Himalaya. Scale, 1:250,000, or 3.94 statute miles to an inch. *Geog. Jour.*, Vol. 31, No. 4, London, 1908.

Illustrates Dr. T. G. Longstaff's account of his surveys in 1907, his route in 1905 also being shown. Heights determined by boiling-point and aneroid are in red. The map is based upon trigonometrical points of the Survey of India, supplemented by a plane-table survey and photographs.

SIBERIA.—Expédition de la Khatanga, 1905. Scale, 1:4,200,000, or 66.2 statute miles to an inch. By Helge Backlund. *La Géographie*, Vol. 17, No. 2, Paris, 1908.

Illustrates an account of the geographical results of the expedition to this river in 1905. The expedition made an entirely new map of the region, based upon astronomically fixed points and correcting many errors especially of latitude and longitude in the old map. The new surveys are traced in red, over which is printed the old map showing in what respects and how far it is misleading.

EUROPE.

GREAT BRITAIN.—Bartholomew's "Half-inch to Mile" Map of the River Thames from its Source to the Sea. The Edinburgh Geographical Institute, Edinburgh, 1908. (Price, 1s. paper; 2s. cloth.)

This beautiful map has contour colouring both for land heights and sea depth. The sheet is divided into three sections on which every bend of the Thames may be traced from its estuary to its head sources near the town of Cirencester. The country on both sides of the river for several miles is minutely mapped, the nature of the roads is indicated and the work is especially designed for cyclists and tourists.

THE UNITED KINGDOM.—Maps of the Canal Systems and Navigable Rivers of the British Isles. Scale, 1:633,600, or 10 statute miles to an inch. Four plates. Royal Commission on Canals and Waterways, London, 1906-1907.

These sheets, with the accompanying indexes, give a graphic idea of the distribution, extent, and comparative importance of the waterways of the United Kingdom. The canals and navigable parts of rivers are shown in coloured lines. Plate 1 (two sheets) gives these data for England and Wales; plate 2, for Ireland; plate 3, for Scotland, and plate 4 (two sheets) is a map of the catch-

ment basins of England and Wales, showing the canal systems in each with information regarding average rainfalls, levels, etc.

The Royal Commission will soon issue another map showing the canal systems of England and Wales, arranged according to the control by railways or independent authorities, and showing also their carrying capacity.

UNITED KINGDOM.—Average Rainfall 1870 to 1899. Scale, 105 statute miles to an inch. By Dr. H. R. Mill. *Scot. Geog. Mag.*, Vol. 24, No. 4, Edinburgh, 1908.

Illustrates a paper by Mr. Andrew Watt, "The Climate of the British Isles." The map is based on a thirty-year period. Three major grades of rainfall are shown by various shadings, very dry areas are unshaded, and areas with from twenty-five to forty inches are lightly shaded.

OCEANIC LANDS.

CANARY ISLANDS.—Geologische Karte der Caldera von La Palma. By C. Gagel. Scale, 1:50,000, or 0.7 statute mile to an inch. *Zeitschrift* of the Berlin Geog. Soc., No. 3, 1908, Berlin.

Gives the results of Gagel's study of this depression. The geological data are given in black and tints of green, contours, with 250 meters interval, are black and the map is based upon Sapper's hypsometrical map.

NEW POMERANIA.—Der nördliche Teil der Gazelle-Halbinsel. Scale, 1:100,000, or 1.5 statute miles to an inch. Two sheets. *Mitt. aus den Deutsch. Schutzg.*, Vol. 21, No. 1, Berlin, 1908.

Based upon surveys by Wilhelm Wernicke and the German naval steamer *Möwe*. The large scale admits much detailed information, such as Government, private, and aboriginal lands, distinguished by colours; the nature of the soil, the extent of grass and cultivated lands and swamps, position of government and mission stations and landing places of steamship and commercial companies.

NEW GUINEA.—Die Umgebung des Hansemann-Berges (Kaiser-Wilhelmsland). Scale, 1:20,000, or 0.3 statute mile to an inch. *Mitt. aus den Deutsch. Schutzg.*, Vol. 20, No. 4, Berlin, 1907.

Based on the surveys of the Rhenish Mission. Boundaries of the tribal areas, mission lands, and reserves in red, rivers, blue, relief forms, brown.

NEW GUINEA.—Der Sattelberg und Umgebung (Kaiser Wilhelmsland). Scale, 1:100,000, or 1.5 statute miles to an inch. By M. Moisel, with new surveys by Dr. Rudolf Pöch. Jan.-Feb., 1906. *Mitt. aus den Deutsch. Schutzg.*, Vol. 20, No. 4, Berlin, 1907.

Illustrates a paper by Dr. Pöch "Wanderungen im Gebiete der Kai" (Deutsch-Neuguinea). Dr. Pöch's route is in red. This is the first map material yet obtained for this region, only five to thirty miles back of the coast.

GENERAL.

WORLD.—Globuskarte. Weltkarte in Teilkarten in Einheitlichem Flächenmassstabe. Scale, 1:74,000,000, or 1,167.8 statute miles to an inch. By Captain

F. Sipman. With statistical tables of independent states and the German colonies. Dietrich Reimer (Ernst Vohsen), Berlin, 1907. (Price, 1 M.)

The globe is divided into six equal parts, extending north and south from pole to pole, each part embracing 60° of longitude. The parts, of course, have thus exactly the same area. This method of representing the earth surface has not come into common use because it has the great disadvantage of widely separating the regions lying north and south of the tropics, destroying the cartographic unity of the globe as a whole and separating portions of the Eurasian and North American continents.

This defect is remedied in the Sipman map by sketching in the cut-off areas in the vacant spaces in the northern and southern parts of the map, these areas appearing again, of course, in their proper sections.

With the aid of this supplementary mapping we have before us the continents in their entirety, while the six parts of the map proper give advantages that cannot be secured by any other method of representing the earth on a flat surface.

Equal areas in any part of the earth's surface have equal areas on the map. On the Mercator projection the German colony of Kamerun has the appearance of being about one-third as large as Germany while, in fact, it has nearly as great an area. But the Sipman map shows correctly the proportionate part of the earth's surface occupied by every land and also its correct position between the equator and the poles, two points in which some other projections are very misleading.

Eight colours are used to show political divisions. The most important sea-trade routes, with the distances from the English Channel marked on each in hundreds of nautical miles, are an excellent feature. The map is accompanied by statistical tables which give a comparative view of all the nations and the German colonies in relation to their size, population, army and naval forces, trade and communications. The price of the map and statistical tables is very small. The work should be enlarged to a wall map giving more detail.

BOOK NOTICES.

Relations between Bermuda and the American Colonies during the Revolutionary War. By Addison E. Verrill. Transactions of the Connecticut Academy of Arts and Sciences, Publications of Yale University. vol. viii, pp. 47-64. New Haven, Conn., July, 1907.

The study of insular lands has always been full of interest to geographers, affording, as these lands often do, so many miniature and safely discernible types of readjustments in response to the depletion of old and the discovery of new resources. If the islands possess varied physical features and conditions and great size, such readjustments may be numerous and important, as in the case of the British Islands. If they are topographically and geologically simple and of no great extent, the resources and consequent distribution of people are relatively fixed, as is well illustrated in many of the Bahamas, and the South Sea and circumpolar islands. In the latter case readjustments are principally owing to exterior conditions or relations in the nature of reactions controlled by versatile peoples living under favourable and varied conditions. Further consequences

which depend upon insularity are numerous, some of which have already been noted, as for example in Ratzel's paper on the geography of Corsica, Mackinder's generalizations relative to the British Islands and seas, and Hogarth's studies of the Ægean islands in relation to Greece and Anatolia.

From the point of view of exterior relations, the paper under review is crowded with interesting data. It appears that tobacco culture, an early resource of the Bermudas, suffered by competition with the more fertile soil of Virginia, and from that over-production which was the curse of the colonial market for a long period. The decline of tobacco culture continued steadily until it finally ceased altogether in 1700, whereupon the inhabitants became very much impoverished, for they had few products to export and were unable to raise sufficient foodstuffs to support themselves; a condition which continued down to and after the Revolutionary War. There was a superabundance of slaves without adequate employment, the islands were over-populated, and release from the intolerable conditions to which this gave rise was found in traffic with the American Colonies for food and clothing. "Cessation of that traffic meant destitution, if not famine, for them." The amount of cereals was small, and agriculture was both crude and primitive.

Under these circumstances, it was natural that emigration should begin and that other more resourceful activities based upon external conditions should be developed. Many of the more enterprising emigrated to America. Ship-building was undertaken, the Bermuda cedar being admirably adapted for this use. Salt works were erected in the Bahamas and men went there during the winter season to manufacture salt. This became the principal export in exchange for imports from the American Colonies of food and clothing. The high price of salt in the colonies was notable, and to the relative absence of its production in America is due the escape from utter failure of the Bermudians during this period. The crowding of the population out upon the sea for a living gave rise to the condition whereby Bermudian vessels monopolized the West Indian and coastwise trade of the American Colonies for nearly sixty years. To all of these sources of intercourse with the mainland is to be added the fact that many natives of the islands, from the best families, went to America for their education and often remained there in business or in some profession. These intimate business relations and family ties coupled with the independent love of liberty of the Bermudians themselves, naturally led to friendliness and sympathy with the Americans during the Revolutionary War. This sympathy, and the independent grounds of complaint on the part of the islanders against the British Government, found expression in repeated clashes between Royal Governor and Assembly, and ended in 1780, when the Governor dissolved that body for rebellious conduct. The reciprocal attitude of the Americans was expressed in the sending of large quantities of provisions, allowing the free importation of salt (perhaps a not wholly unselfish regulation), granting certain port privileges and exempting Bermuda vessels from capture by American privateers, a set of privileges not accorded other English colonies. Undoubtedly, too, the fundamental necessities of food and clothing required a continuance of the præ-bellum traffic on the part of the islanders, and as gunpowder, saltpetre, sulphur and firearms were in great demand in the Colonies, these commodities were supplied rather from motives of profit than patriotism. It was provided in a resolution introduced by Benjamin Franklin and passed July 15, 1775, that vessels importing the above articles

should be allowed to export products of equal value to insure a profit at each end of the voyage, a great inducement to traffic on the part of the Bermudians.

An act of Congress dated Nov. 22, 1775, considered the needs of the islanders and permitted the exportation of foodstuffs. The allotment of the several exports of food is an interesting reflection of the geography of the Colonies. South Carolina was to supply the rice, North Carolina, Virginia and Maryland the Indian corn and beans, Pennsylvania and New York the flour and beef or pork. The apparent solicitude of the Americans was undoubtedly in great measure due to the part which the islanders played in the famous seizure of gunpowder in 1775. This was carried off by an American expedition with the help of some of the sympathetic islanders, from a public powder magazine on the islands and supplied to the armies in the field. The traffic in all commodities is inferred to have been attended with considerable risk, as the governors considered it treasonable. Certain it is that there was more or less destitution during the war, because of restricted trade.

The strategic advantages which the islands possessed were recognized by many at that time. One member of Congress who visited them described the harbours and channels, and advised Congress to take possession of and fortify them and build and fit out vessels to destroy British commerce in the West Indies. It was doubtless deemed impracticable to carry out this plan, on account of the slender naval resources of the Americans, as seen after they had gained the assistance of the French fleet. So thoroughly American were the Bermudas in sympathy, by virtue of the affinities already specified, that in the Treaty of Commerce and Alliance between France and America, signed Feb. 6, 1778, "it was stipulated that all the West Indies, if conquered, should belong to France, but that Bermuda should be added to the United States."

Professor Verrill's paper, although short, contains an abundance of suggestive material and is well supplied with references to authorities. It is brought out very clearly how important was the connection which these islands established with the Americans by virtue, not only of their geographical position with respect to our shores, but also because of the complementary relation which their products sustained to our needs, coupled with a general emigration induced by the decline and final cessation of tobacco culture. It may be suggested that such island studies are of prime importance in geography, for in them we shall perhaps find portrayed in clearer manner than on the mainland these strong contrasts that natural divisions tend to offer, not only in the matter of products and needs, but also in political thought and action. In case of such tendencies to contrast on the mainland, the lines of separation are blurred by the rivers that cross from one natural province to the other and by the more complete intercommunication in general afforded by land roads than by sea roads. The Philippines, Madagascar, New Zealand, Iceland and Japan ought to yield excellent examples of these and other principles upon thorough study. I. B.

Modern Argentina: The El Dorado of To-Day, with Notes on Uruguay and Chile. By W. H. Koebel. Pp. 328. F. Griffiths, London, 1907. (Price, 6 shillings.)

After reading carefully to the end the present work, one lays it down with the sincere regret that there is not more of it. In fact, he gladly takes it up again and peruses the various chapters independently of each other, as a source of con-

tinued profit and enjoyment. There is a spirit of justice and fairness throughout these pages not common to British literature on other countries and their people, and positive proofs of practical knowledge of the subject that may serve as a model for many modern writers in similar fields. Unfortunately for our earnest desire to do justice in detail to the excellence of the volume, the topics treated are geographical only in a secondary way and the treatment is on the popular line, which does not make the volume less valuable. The style is very clear and fascinating and the modesty of the author so great that he does not mention himself or anything remotely connected with him in the 370 pages of the text. The pictures are numerous and very good.

Without the aid of statistics and paraphernalia of mathematical geography, the reader obtains a very good general idea of the nature of the countries described. The descriptions are not only life-like but living. This is especially the case with the *population* of the three South-American republics, Argentina, Chile and Uruguay. The author conceals no defect of any importance in national character, but treats these failings with tact and decorous consideration. The differences in type of character are perfectly indicated in every case. The chapters on the natural history of the Argentine are very interesting and instructive. We may note a misapprehension concerning the *Vizcacha,* which is called a prairie-dog. The German term, "Hare of the rocks (Felsenhase)," is more appropriate, though in its burrowing habits the vizcacha resembles the prairie-dog. So the hare and the rabbit may as well be assimilated to *Arctomys latrans* as to *Lagostomus trichodactylus.*

In view of the fairness, thoroughness and perspicacity displayed by Mr. Koebel, we regret that he has not devoted any space to the other European colonies on Argentine soil beyond the British. In one place he mentions Italian labour as the tool of British capital. The Italian colony is the most important in numbers and of late it has exerted great influence in financial and industrial matters. It would have been very interesting and valuable to have the impartial views of Mr. Koebel on the *rôle* played by the European factors in the development of the Argentine Republic. A. F. B.

D. Detlefsen. Ursprung, Einrichtung und Bedeutung der Erdkarte Agrippas. (Heft 13: **Quellen und Forschungen zur alten Geschichte und Geographie, Herausgegeben von W. Sieglin.**) Berlin, Weidmannsche Buchhandlung, 1906.

It was Agrippa who appears to have constructed the first map of the Roman Empire. Pliny tells us, and he is our chief source of information, that this map was sketched on the walls of a portico in Rome, and he implies that the Emperor Augustus had something to do with its execution; perhaps it was completed at the instance of the Emperor on the death of Agrippa.

This map has been the subject of many commentaries, and in this monograph of 117 pages we have one of the most pointed and most interesting of the list. The author states it as his purpose to consider the origin, construction, and significance of the map. This analysis he follows in his discussion. Whatever the part taken by Augustus, the opinion is here expressed that to Agrippa chief credit is due for the orderly arrangement of the material at hand and for the draughting of considerably more than the mere outline of the map. He does not think the evidence sufficient to warrant our giving Agrippa first rank as a trained

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geographer, such as was the Greek Eratosthenes. The purpose in the construction of this map was not so much to advance the science of geography as it was to present a picture of the Roman World which would be useful.

Pliny names the provinces which it seems Agrippa attempted to describe, and our author thinks the most important information respecting the map given by Pliny is his reference to the length and breadth of the provinces as Agrippa had determined them, or, in other words, his measurements of the Roman World.

Exception is taken in this monograph to Konrad Miller's view, expressed in his *Mappae Mundi,* that pictures of cities, of marvelous races of men and animals were represented on the map, also to his view that the map was round and that it represented the east at the top, the form and orientation so common in mediæval maps. Arguments are presented to support the view that the map was rectangular in form, and that the top of the map was the north. Several pages are given to the consideration of what might be called the later sources of information concerning the Agrippa map. It is pointed out how much of probable truth we may find concerning it from such works as the *Divisio Orbis,* from the monk Dicuil's *De mensura orbis terrae,* also from Strabo, Orosius and Æthicus.

It does not appear that any expert map-maker attempted to improve upon the Agrippa map in Roman Imperial days. It remained an authority throughout the Roman period.

After Pliny's work all definite reference to the author disappears and his name seems to have been forgotten. It is the name of the Emperor Augustus which is usually found in the few remaining direct references to the map. The author takes up each of the provinces, islands, and seas which were given on the map and adds brief comment in each instance.

Of the influences exerted by the map there are but few instances to be noted. The Tabula Peutingeriana, the author thinks, gives some evidence of this, and that it also interestingly shows the practical trend of Roman map-making, in that it magnifies Agrippa's idea of representing Roman roads and Roman stations with distances.

As for Agrippa's influence on the cartography of the Middle Ages, our author, not agreeing with Miller, finds scarcely any evidence of it. A comparative table is presented to disprove the oft-repeated assertion that the Hereford map, for example, was based upon the Agrippa map.

The author makes no attempt at a reconstruction of Agrippa's work, but as stated above, he does not feel inclined to accept such attempts as have been made, or even the suggestions as to the probable appearance. Its historical value lies very largely in the fact that it was a presentation of the Roman world at a time when conquest was geographically extending that world. E. L. S.

The Asiatic Danger in the Colonies. By L. E. Neame. xvi. and 192 pp., Index. George Routledge & Sons, London, E. P. Dutton & Co., New York, 1907. (Price, 3s. 6d.)

The author suggests that the tropical colonies which require coloured labour may be left to do as they please about the admission of Asiatics. But in those colonies which aspire to be "A white man's country," three principles should be kept in mind: (1) masses of Asiatics as permanent residents should be kept out as far as possible; (2) if indentured labour is needed, repatriation should be insisted upon at the expiration of contracts; and (3) fair, even generous, treatment should be given to those Asiatics who have become a part of the population of the country.

Mr. Neame asserts that a large influx of cheap coloured labour is ruinous to the white workman. Free Asiatic immigration must inevitably mean a low standard of living for the white working classes—if there is any chance of their living at all. In South Africa the danger of Asiatic immigration is peculiarly great, for it means not only decreased openings for white men but also another obstacle placed in the way of the advancement of the native population. The author agrees with Sir Harry Parkes, who wrote: "It is our duty to preserve the type of the British nation, and we ought not, for any consideration whatever, to admit any element that would detract from, or in any appreciable degree lower, that admirable type of nationality."

Reise in das Moderne Mexico. Von Mietze Diener. 112 pp., 30 Illustrations from Photographs and Map. A. Hartleben, Vienna, 1908. (Price, M. 2.)

The author attended the Tenth International Geological Congress in Mexico, and participated in both the northern and southern excursions which were a part of the programme of entertainment and study. Her aim in this little book is to give an idea of the astonishing material development of the republic in recent years and its present condition. The book is readable and informing and the pictures are original.

Paraguay. Das Land der Guaranis. Von Dr. Wilhelm Vallentin. viii and 323 pp., and 38 Illustrations from Photographs. Hermann Paetel, Berlin, 1907. (Price, M. 6.)

A careful and excellent account of Paraguay written in a popular vein, but still full of solid information about all aspects of the republic. The author is a German scholar and an authority on economic geography. He says that the comparatively temperate climate and the great natural riches of the country fit it for a high stage of development. It offers excellent opportunities for the immigration of farmers. The Guarani Indians and the white and Guarani half-breeds, who form the majority of the population, have proved their desire and capacity for progress. The country was completely ruined by the despot Lopez and the war with Brazil and Argentina, in which he involved Paraguay between 1865 and 1870, but it has fully recovered and is rapidly growing in population, commerce, and social development. The illustrations from photographs are an instructive feature.

Africa. Vol. 1. North Africa. By A. H. Keane. (Stanford's Compendium of Geography and Travel (new issue).) Second edition, revised. xx and 640 pp., 9 Maps, 77 Illustrations, and Index. Edward Stanford, London, 1907. (Price, 15s.)

It is twelve years since the first issue of this work appeared. The geographical conquest of Africa in that time has made such rapid progress that the era of large discovery is now at an end. The present edition gives full details of all new discoveries, as well as summaries of the many political changes in the past few years. The volume is, therefore, the fullest account of North Africa brought down to date, and the fact that Dr. A. H. Keane wrote the book has insured a high degree of accuracy.

Eine Deutsche Gesandtschaft in Abessinien. Von Felix Rosen. xii and 496 pp., 160 Illustrations and Map. Veit & Co., Leipzig, 1907. (Price, 10 M.)

This is one of the handsomest books on Abyssinia. It describes the visit in 1905 of the German Embassy to Emperor Menelik II. when a treaty of friendship and

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commerce was concluded and every opportunity was given to the distinguished visitors to see the country. The journey extended from the French port of Jibuti over the railroad to the once forbidden city of Harar, thence by caravan to Menelik's capital, Adis-Ababa, and northward to Lake Tana, the famous towns of Aksum and Adua and the northern limits of the country. An exceptionally fine feature is the numerous original photographs taken along the line of march, probably the best series of views of the manifold phases of Abyssinia that has yet been secured. The book is full of information about the life and activities of the country, and gives special chapters to the railroad, Harar, Adis-Ababa, Menelik, Lake Tana, the historic city Gondar, Aksum and Adua, and the Italian colony of Eritrea, through which the embassy passed to embark for home at Massowa.

Through the Heart of Brazil. By Frederick C. Glass. 136 pp., Illustrations and Maps. South American Evangelical Mission. Liverpool, 1907 (?).

This is the record of a journey by three missionaries from the Atlantic coast across Brazil and through the interior States of Goyaz and Matto Grosso. On the return they descended the Paraguay and Paraná Rivers to the sea. The journey was about 5,000 miles long. The geographical interest of the book is confined to the glimpses it gives of the settlements and peoples of the interior and of the Indian tribes in regions of which comparatively little has been written.

The Government of India. Being a Digest of the Statute Law Relating Thereto, with Historical Introduction and Explanatory Matter. By Sir Courtenay Ilbert. Second Edition. xxxii and 408 pp., Tables and Index. The Clarendon Press, Oxford, 1907. (Price, 10/6.)

A revised edition of the book which was first published in 1898. It is a digest brought up to date of the existing statute laws passed by Parliament and relating to the government of India. It is difficult to thread the maze of existing statutes, and this digest is calculated to be useful to those who are practically concerned in Indian administration and to students of Indian administrative law.

Recollections of an Ill-Fated Expedition to the Headwaters of the Madeira River in Brazil. By Neville B. Craig. In Cooperation with Members of the Madeira and Mamore Association of Philadelphia. 479 pp., 6 Maps, Numerous Illustrations, Appendix, and Index. J. B. Lippincott Company. Philadelphia and London, 1907.

The hard-luck story of the attempt to build a railroad around the falls of the Madeira River in 1878 is well told in this book by one of the engineers engaged in the work. The scheme of connecting the navigable upper and lower reaches of the Madeira system by rail so that Bolivia should have easy steam transportation to the Atlantic for her vast mineral and vegetable products was one that early engaged the attention of Col. George Earl Church, now recognized as a leading authority on South-American geography. A civil engineer of eminence, he was the most prominent man in the enterprise from its inception to its collapse. Not a few of the engineers were young men of uncommon promise who have since won distinction. They showed the stuff they were made of in those tragic months on the Madeira and the account of their plucky though ill-fated endeavour is of dramatic interest. The book gives vivid impressions of the vicissitudes of life in the forest regions of the Amazon basin. The undertaking that failed then is that which Brazil agreed in her treaty with Bolivia in 1904 to carry out, and she has placed the railroad enterprise in the hands of an American syndicate.

Le Pérou Économique. Par Paul Walle, Pp. xvi–388. E. Guilmoto, Paris, 1907.

The preface, due to the pen of Mr. Paul Labbé, Secretary General of the Society of Commercial Geography, Paris, might have been spared. It gives to the author a recommendation which he does not need, and it contains a "fling" at the so-called "globe-trotters," which the latter do not deserve. The historical part of the first chapter could also have been omitted for the many errors it contains and, in general, Mr. Walle does not shine very brightly in anything connected with Peruvian ethnography and colonial history. For the latter period he has little but vituperation, resulting from the ignorance and traditional bias so deeply rooted among Europeans and, to a large extent, still flourishing in this country. For the Peruvian Indian he has, of course, unbounded sympathy that causes him to go astray now and then. For instance, to say that acts of violence and crimes are so exceptional among the Quichua is utterly out of place. Bloody squabbles between Indian communities on the highlands are very common; so are individual crimes. We can affirm, from personal knowledge, that the Indian takes the greatest possible care to cause every evidence of such misdeeds to disappear. For this he has ample opportunity, and Peruvian justice knows the hopelessness of the attempt to discover, let alone to punish, crimes of that sort. The book is avowedly a guide for French emigrants. With laudable frankness Mr. Walle confesses the stimulus that gave occasion to its writing. In the first place, it is acknowledged by French colonial authorities of the highest rank (quoted by Mr. Walle) that there is no prospect for French colonists in any of the ultramarine possessions of France; either a monetary crisis or the superabundance of cheaper native labour renders the position of immigrants next to untenable, so that French emigration must turn to foreign countries. In South America, Chile, the Argentine, and Brazil are monopolized by German and English commerce and industry. The French flag has practically ceased to float in the Pacific. Perú, while attacked on all sides by European and North-American enterprises, is the only country where French colonization still has a show, unless it be in Ecuador and Colombia, which, though less accessible, may eventually present a fertile field. In Perú, France has already a very solid foothold. The Peruvian army and navy are under the exclusive educational and organizing control of French officers and French influence is strong in other branches of public life. Furthermore, as Mr. Walle very justly observes, there is a decided affinity between the French and the Peruvian character that creates a bond of sympathy which can and should be improved in furtherance of French commerce and industrial arts, and in directing French emigration towards a country where it is likely to receive a specially favourable reception.

Most of the information conveyed by Mr. Walle for the benefit of settlers in Perú is, as far as practical life is concerned, trustworthy. His judgment of the Peruvian is as sound as his opinion of the Indian is exaggerated. It is to be remembered, however, that the author considers the Indian as an asset for the immigrant; as his servant and helpmate to be, and that therefore he mitigates the disadvantageous side of the Indian character. In regard to geographical data it strikes us that he places too great reliance upon the works of Paz Soldán. He would have done better to consult more thoroughly the monumental labours of Antonio Raimondi. But his picture of the nature of the country is usually very true. He holds on to a sober representation of circumstances and facts, avoiding unnecessary flourishes, and writing, in general, for the practical mind and not for the imagination. Very valuable statistical data are given with a touch of sound

criticism. There is no display of tables. The figures are given in a cursory manner that makes them more useful because more impressive.

The book is an unpretentious one and lays no claim to scientific elaboration. It is the work of one who, if not long resident in Perú, has seen much, and made excellent use of his opportunities. Foregone conclusions, influenced by personal sympathy or antipathy, inevitably protrude here and there, but they are not offensive, except in the case of historical judgment; but, as the latter are only incidental, no grave strictures are called for.

Mr. Walle looks at the future of Perú in a favourable light, and we believe his hopes to be justified. The people have become thoroughly convinced that peaceable development alone is in the interest of the nation; that the time for violent dissensions is passed and will not so easily return, hence the call for immigration to Perú, intimated by the work before us, is timely and justified. When, as in the present instance, this call is accompanied by valuable information and reliable guidance, it becomes a worthy accession to geographical literature.

The illustrations are not of a high character and they are indifferently selected. The map is of small size, not incorrect, but it gives comparatively little detail. The bibliography at the end is scanty and limited to the most recent literature in French, with some modern Peruvian sources. One book in the English language is also mentioned. A. F. B.

Studia Pontica. II. Voyage d'exploration archéologique dans le Pont et la Petite Arménie. Par F. et E. Cumont. Bruxelles, H. Lamentin, 1906. (Price, fr. 17.50.)

The authors present in this book a scientific account of an archæological expedition to Pontus and Lesser Armenia. To a certain extent their narrative is also of geographical value, not so much through its occasional descriptions of the landscape as by virtue of the striking picture that it gives of the character of a country in which so many different civilizations have succeeded each other. The large number of fine illustrations will especially interest the geographer as well as the archæologist. M. K. G.

Das altsächsische Bauernhaus in seiner geographischen Verbreitung. Ein Beitrag zur deutschen Landes- und Volkskunde, von Dr. Willi Peszler. Braunschweig, Fr. Vieweg und Sohn, 1906.

In the old countries where each province has developed not only an individual dialect, an individual style of dress, and an individual type of settlement and of house-structure, the studies of such characteristics form an important branch of ethnology as well as of home geography. It is from this point of view that Dr. Peszler has taken up the detailed study of the "Old-Saxon" farmhouse and the geographical boundaries of its occurrence. This type of dwelling—mainly rural, but often also modified to meet the needs of urban surroundings—is the characteristic house of the lowland of Northwestern Germany, the country of the old Saxons from whom it derives its name. It is a very large building which unites under its roof the living rooms, barns, and stables, in opposition to the "Franconian" house of upper Germany, where dwelling-house, barn, and stable are separate buildings enclosing a central yard. The most prominent part of the Old-Saxon house is the high and wide *dele* (Diele) or hall, which runs lengthwise through the whole structure on the ground floor. Right and left of it are the partitions for the animals, hay, and grain, and along the back wall, transversely

to the *dele,* the chambers of the family and servants. The front part of the *dele,* next to the large entrance gate which occupies the whole width of the *dele,* and, consequently, of the front wall, is the scene of all the farm occupations that are not performed outdoors. Through the gateway the harvest wagons enter to be unloaded, the corn is thrashed here, etc. The back part of the *dele,* the *"flett,"* is distinguished from the front part by a mosaic floor of small pebbles or stones, and figures as the general meeting and sitting room for the whole household. Here, in the centre of the back wall, is the large genial fireplace around which the family gathers, and from her seat by the fire the mistress of the house can watch the maids working in every part of the house. To this social function of the *dele* the architectural one corresponds. The distinctive structural feature of the Old-Saxon house is the comparative insignificance of the outside walls. The *dele* is the centre, structurally, too. The main supports of the whole house are not the walls, but the two rows of heavy oaken posts which hold the two parallel longitudinal walls of the *dele.* Each two of them are connected by transverse beams, and on them the rafters, and the whole roof, rest. The construction thus resembles that of a three-aisled church, more especially a basilica, and the side aisles could be removed walls, roof, and all, without injuring the safety of the main structure. To any one conversant with Mucke's "long-house" theory these descriptions of the author will be most interesting. The author does not, however, digress into the prehistoric problems of his subject; his purpose is to determine the geographic distribution of this interesting type of dwelling and to ascertain its boundaries before fire and modern building regulations shall have rendered this task impossible. He has personally explored, on foot, on wheel, and by train, almost every village and hamlet of Northern Germany, so that it is hard to imagine one specimen that should have escaped his notice. The result of his wanderings, of which the maps accompanying the book give us an approximate idea, is that the boundaries of this typical Low-German house are not identical with those of the Low-German dialects, nor with any special type of settlement. The book is one of the most valuable contributions to the home geography of Germany, for its contents as well as for the avenues of further research along similar lines which it opens; and with its 171 illustrations and 6 plates, all of them most beautifully executed, will be a treat for the lover of the picturesque of any nationality.

M. K. G.

Beiträge zur Geophysik. viii Band, 1. Heft. Leipzig, George Engelmann, 1906.

This issue of the *Beiträge* contains seven papers, three of which deal with seismic problems. The first is an article by Charles Davison, Sc.D., F.G.S., on *"The relative velocity of earthquake waves and earthquake-sound waves."* The author questions the theory generally accepted by seismologists that, because the sound of an earthquake is often heard before the shock is felt, sound waves travel with greater velocity than earthquake waves. According to that theory, the percentage of observers who heard the sound before the shock came ought to increase, and the percentage of those who heard it with or after the shock ought to decrease, with the increasing distance from the earthquake centre. His observations of English earthquakes, however, showed that both classes of observers decreased in proportion to the increasing distance. He concludes, therefore, that the early sound waves take their origin, not at the centre, but at the nearer margin of the seismic focus, so that their velocity need differ but little, if at all, from that of the earthquake waves.

In another paper the same author offers observations on *"the Effects of an Observer's Conditions on his Perception of an Earthquake."* This means that, while the maximum of frequency as registered by instruments occurs about noon, the one based on personal observations occurs at 10 P.M. and at 2 A.M., viz.: at times when quiet prevails or, aroused from their first sleep, people will lie awake and be sensitive to the slightest tremors. Furthermore, observers indoors describe identical shocks as longer than do those who feel them outdoors. Observers in town, too, often mistake artificial tremors for genuine earthquakes and compare the sounds to passing wagons, etc., while the rural observer likens them to thunder, wind, etc. The position of houses influences observations in so far as shocks are more readily felt in buildings whose main walls stand perpendicularly to the direction of the shock. In badly built houses, shocks are felt more strongly on the upper stories than on the ground floor. Persons just roused from sleep describe the same shock very differently from those who were awake when it came. Thus, records of intensity, duration, direction, audibility, and nature of sound may be biassed by subjective conditions for which allowance must be made in working up personal observations.

In a third paper: *"Ostasiatischer Erdbebenkatalog,"* Dr. E. Rudolph reproduces the observations made at the seismic and meteorological stations of Tokio, Manila, Batavia, Koeta Radja (Atjeh, Sumatra), and Si-ka-wei (Shang-hai). He reiterates De Ballore's plea for a more even distribution of seismological stations in the far East.

Wilhelm Krebs (*Staubfälle, besonders im Passatgebiet des nördlichen Atlantik*) records observations on atmospheric dust from the log books of German merchantmen in the region of the North Atlantic trade belt, pointing out the parallelism between the increased frequency of this phenomenon and the volcanic activities of 1901-1903.

Dr. Th. Arldt (*Parallelismus auf der Erdoberfläche*) presents tables and formulas for the measuring of absolute, orthodromic, and loxodromic, parallelism by means of which the arrangement of the tectonic features of the earth's surface may be mathematically determined; Karl Fuchs (*Wirkung der fluterzeugenden Kräfte auf die Massenelemente*) describes a method of deriving local effects of the tide-producing forces from local conditions, and Dr. G. Greim (*Studien aus dem Paznaun II. Der Jamtalferner*) contributes a paper and map on observations made at the Jam Valley glacier which prove a recession of glaciation in that valley. M. K. G.

Höhlenkunde, mit Berücksichtigung der Karstphänomene. Von W. v. Knebel. Braunschweig, Friedrich Vieweg und Sohn, 1906. 42 Illustrations and 4 Plates. (Price, M. 5.50.)

For purposes of classification, the author distinguishes between caves of primary origin (*ursprüngliche Höhlen*), viz.: caves formed during the process of formation of the rocks in which they are found, and caves of secondary origin (*später gebildete Höhlen*), viz.: such as were hollowed out of the existing rock by outside agencies—water, wind, etc. Among the former the most important are the lava caves, formed by a stream of lava flowing away under the hardened surface of the flow and leaving a cavity under that surface, as, for instance, the Surtshellir Cave in Iceland. Caves of secondary origin are either genuine (*echte*) or pseudo-caves (*Halbhöhlen*), the latter including sea-caves, desert-caves (due to wind erosion), glacier-caves, and the like. Genuine caves are

geographically associated with, and form a characteristic feature of, the Karst type of landscape, and a scientific study of them cannot, therefore, be satisfactory unless it is carried on as a study of the Karst problem as well. Hence the title of the book. It is the hydrographic conditions of limestone and dolomite regions which bring about the process known as *Verkarstung* of which the formation of caverns is a part. These rocks are easily decomposed by running water and are, also, often full of cracks and fissures which offer the latter so many lines of attack. The result is a system of drainage very different from that in other regions where the water flows in surface streams. As it permeates into the ground more or less vertically, and does not, to a large extent, start on a horizontal motion before it reaches the bottom layer, the author distinguishes the drainage of Karst regions as vertical or bottom drainage from the regular horizontal or surface drainage. In this way, Karst regions produce a system of subterranean water-courses or "cave rivers" (Höhlenflüsse) on which the author's explanation of the cave and Karst phenomena is pre-eminently based.

In speaking of underground waters, the author distinguishes between the permanent ground water and subterranean water-courses. He opposes the theory brought forward by Grund, that it is the former that collects, or connects the individual parts of, the partially engulfed rivers common in Karst regions. While admitting that this may be the case in some instances, he strongly opposes a sweeping generalization which would make it the only possible explanation of the problem. Actual observations of well-known subterranean connections between different rivers, especially of the Danube-Rhine connection, but also of less famous ones in the Austrian Karst, have proved that subterranean rivers do exist and that, after disappearing at the "*ponor*" (the opening where a river is engulfed), the river may continue its course as an individual river underground and re-appear as what the author calls a *Vaucluse spring* (after the famous one at Vaucluse, in the French Alps), namely, at which, instead of the customary stream of water, a fully developed river pours forth.

More evidence in favor of the author's opinion is given by the existence of submarine springs on Karst coasts. They indicate a sinking of the coast by which a former "Vaucluse" spring which opened on or near the shore has been submerged, while the power of the running water is still strong enough to overcome the pressure of the sea water above it. The fresh water, being lighter, rises to the surface and makes the sea brackish where such springs occur. A more complicated type of submerged Vaucluse springs which is also particular to Karst coasts is the "*Meeresschwinden*," or places where the sea water is drawn into openings in the coast whose size is out of all proportion to the volume of water that disappears in them. The best known example is the "ocean mills" of Argostoli, on the island of Cephalonia. There 150,000 cubic metres of water are drawn daily into apparently quite insignificant holes in the coast, and the ingoing current is so strong that it drives two mills by means of artificial holes that have been cut down to the underground channel. The explanation of this phenomenon is given through the existence of a subterranean and, later, submarine, water-course. The canal in which this "cave-river" flows sends forth a branch upward which reaches the surface at about sea-level. The water running in the lower canal establishes a suction in the upper that draws the sea water into it and carries it down to the lower where, together with the cave-river, it returns into the ocean below sea-level.

In a similar process of suction the author gives an explanation of the impetus

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that causes the motion of the cave rivers. The water that escapes at any spring, Vaucluse or ordinary, creates a vacuum back of it which, in its turn, starts a process of suction extending back to the water behind it. Thus a motion is started in the ground water. In proportion as this process of suction extends farther and farther back, it attracts more and more of the percolating waters, thereby increasing its volume and power. The degree to which the rock is shattered, and soluble in water, will give the latter a proportionate degree in hollowing out cavities along its course; hence the frequency of caves in, and the co-incidence of the Karst phenomenon with, limestone and dolomite areas. The more the water hollows out, by decomposition rather than erosion, fully developed canals with a noticeable grade, the more its motion becomes riverlike and ceases to co-incide with the distinctly existing, but far less pronounced one of the ground water proper. When the process has worked back far enough to reach the surface, it creates there an opening which engulfs the stream or river that may be flowing there, and the underground river becomes the continuation of the surface river. When a cave river abandons its canal for another, the formation of stalactites and stalagmites sets in, because it is only possible when the moisture in the cave reaches a certain minimum, so that the percolating water may evaporate. On the surface, sinkholes often indicate the existence of a subterranean river, or at least the former course of one. Some of them are, however, not due to the caving in of the roof of a cavern, but to the decomposition of the rock along more or less perpendicular cracks. Such sinkholes have a shaft-like shape. The term *sinkhole* ought, therefore, not to be used geologically, but morphologically only. A series of sinkholes may form valleys, and this type of valley is another characteristic of the Karst, where genuine erosion plays such a small part in the modeling of the landscape. The author suggests the term *Vaucluse Valley* for this type. Very large sinkholes filled out with alluvial deposits often resemble lake bottoms, while there is no evidence of a former lake. Such circular valleys have the Slav name of *Poljen,* which the author suggests as a technical term to be adopted for that type.

The last chapters of the book are given to the meteorological, biological, and prehistoric aspect of spelæology, and to the economic and agricultural problems of the Karst. It will certainly not fail to reach the purpose for which it was written, namely, to present a scientific treatment of the physical geography of caves in a form that will awaken the interest of the lay reader and enlist his co-operation in the observation of the processes described, in order to increase the as yet scanty material available for scientific investigation. M. K. G.

Colección de Libros y Documentos referentes á la Historia de América. Vol. VII. "El Extrañamiento de los Jesuitas del Rio de la Plata, y de las Misiones del Paraguay. por decreto de Carlos III." A study by Father Pablo Hernandes, S.J. Victoriano Suárez, Madrid, 1908.

This modern book is purely historical, being devoted exclusively to the story of the expulsion of the Jesuits from the La Plata region in the second half of the eighteenth century. A discussion of it, therefore, finds no place in this BULLETIN. We would only say that it is dreary and wearisome reading, and that while it may be of importance for the history of a measure that has wrought much mischief for the Indians in the Spanish-American possessions, it is not free from errors in historical appreciation. To ascribe, for instance, the assassina-

tion of Gustavus III. of Sweden (1792) to the influence of the French Jacobins is a manifest mistake. That crime was due to the opposition of the Swedish nobility to the King, and is not to be placed in the same line with the murder of the royal family of France. The author also displays too much partiality for the book of Father Charlevoix on Paraguay. While certainly very valuable, it is not on the level of that eminent writer's work on Canada, for the simple reason that he did not visit personally the La Plata regions. Father Hernandes might also have done well to include the work of Father Martin Dobrizhofer, S.J. (1784), "Historia de Abiponibus," and the letter of Father Lozano, S.J., of 1747 among his sources. It is true, however, that the latter has more properly a geographical value. The succeeding volume of the "Colección" is of much greater importance for geography. The present volume has no index of the contents of chapters. The list appended of Jesuit writers and missionaries is of importance, as it contains references to documents partly unknown and which, in view of the attention paid by the Jesuits to the geography and natural history of the regions explored by them, might be expected to contain valuable data. The letter published at the end, of chiefs of the Guarani Indians, dated 1768 and asking for a return of the Jesuits to their missions, is quite an instructive document. A. F. B.

Colección de Libros y Documentos referentes á la Historia de América. Vol. VIII. "Relaciónes Históricas y Geográficas de América Central. Edited by Manuel Serrano y Sanz. Victoriano Suárez, Madrid, 1908.

In arranging the nine documents published in this volume, the editor has adopted the beautiful system of disorder prevalent (among others) in the "Documentos inéditos de Indias." There is no chronological sequence and barely an attempt at geographical grouping. We also note, as a curiosity, that he gives at the end, among the forthcoming volumes, the "Memorial" of Zurita as "inédito." That the latter has been published more than once seems to be unknown to Señor Serrano.

A lengthy introduction opens the present volume. It is not altogether devoid of interest. The numerous documents given relative to English efforts at making of the Mosquito Coast a basis for obtaining a foothold across Nicaragua to the Pacific are of historical and political significance, and the references in them to the investigations of Colonel Hodgson are well worth preserving. Maps are also alluded to that are not generally known, and to a great extent unpublished. The latter part of the introduction is devoted to copious abstracts from the work of Fray Fernando Espino on missions among the Jicaques of Guatemala. The work of Father Espino: "Relacion verdadera, etc." (Guatemala, 1674), is excessively rare, as well as that of Father Vasquez, whose "Crónica" appeared in 1714-1716. But the fact of great rarity of a book does not justify the incumbrance of an introduction by abstracts that have no bearing upon geographical, and hardly upon ethnographical, topics. Taken from the book of Vasquez, who copies Espino, they are the more superfluous that the treatise of Espino is given in this volume also and relates the same occurrences with greater detail. Interesting are, at the end of the introduction, the biographical details concerning Juan de Pineda, whose report on Guatemala closes the volume. It is well to note that he wrote to the King a report on Cholula (Chololan) in 1594, which it would be interesting to compare with that of Gabriel de Rojas (1581).

The first document printed in full is a "Relación histórica y geográfica de la provincia de Panamá," by Juan Requejo Salcedo, from Dec., 1640. Although lengthy, it is of mediocre importance, being chiefly abstracts from the Latin translation of Herrera's "Historia General" of 1622 (not 1527 as the document has it) and from a report by Father Juan Fonseca, printed, but exceedingly rare. The latter deserves some attention for the description of the great earthquake which devastated Panamá in the first quarter of the seventeenth century. It is accompanied by very picturesque references to Pliny and Albertus Magnus on the origin of earthquakes and their geographical distribution and by a discussion of their possible connection with eclipses. The part containing ecclesiastical matters is mostly due to the pen of Requejo himself.

Of substantial value is the next document, an anonymous "Descripcion de Panamá y su Provincia" written by command of the Audiencia of Panamá in 1607. It is a most minute description of the city and its territory and of great importance to local geography. Every height, valley, plain, river, bay and inlet is not only enumerated, but every feature of it described in detail; the climate, hygienic (or rather unhygienic) conditions stated, and every imaginable disease, with its proper remedy as far as known, except—yellow fever! It is as if that scourge had not made its appearance in Panamá during the sixteenth century. Of considerable value for the naturalist are the profuse lists of Spanish and aboriginal names of animals and plants and the qualities useful as well as noxious of each plant carefully detailed. It is to be regretted that this document (like the preceding one) is disfigured by a number of impossible dates, like the foundation of Panamá in 1509 instead of 1519, the discovery by Balboa of the South Sea in 1503, and the like, which throw a veil of uncertainty over other dates mentioned and not generally known. Also the manuscript persists in calling Vasco Nuñez de Balboa, Blasco Nuñez Vela. This is the only error of the kind the editor sees fit to correct.

The "Diario" or journal of the operations relative to the evacuation of Cape Gracias á Dios (Mosquito Coast) by the English in 1787 is of small importance and only shows how reluctant the English were to abandon that point, even after they had been ordered to do so, and how much they endeavoured to impress the natives with the probability of their return.

The document following: "Relación del Reconocimiento Geometrico y Politico de la Costa de Mosquitos," in the year 1790, is the natural corollary of the preceding and embodies the results of the geographical and hydrographical surveys practiced by the Spaniards. It is a description of the coast that is by no means devoid of value, especially when placed in parallel with more or less contemporary English reports.

Of the same character are the several abstracts from Spanish reports on the Mosquito Coast and parts of Guatemala from the years 1791-1804.

The "Relación Verdadera" of Fray Fernando de Espino, 1674, we have already alluded to. It has the merit of being a reprint of a pamphlet of which only one copy is supposed to exist.

The group of documents touching the project of settling (reduction) and ultimate conversion of the "Jicaques" Indians of Honduras offers but little interest. There is in the first document a description of the region which they occupied that has some local value. The Jicaques or "xicaques" now live on the rio Sumaque in Honduras, they maintain their autonomy if not their independence, and speak a language that has not yet been classified.

To these Indians the last document of the collection, "Descripcion de la provincia de Guatemala," 1594, by Juan de Pineda, belongs. It is preceded by a royal mandate to the author, appointing him to the task of making a census of all the Indians of Guatemala directly depending on the crown, for the purpose of proper collection of the tribute. The fruit of this decree is the "descripcion" here mentioned, and, while it is dry and purely matter of fact, it becomes the more valuable since it presents in a condensed form the population of Guatemala, especially as regards the Indians, a number of brief allusions to topography and to the agricultural and other resources of the country as known to a man who had lived in Guatemala since 1552. This report may, in some respect, not be regarded as fully impartial. The object of Pineda was, to prove to the King that the crown did not derive the proper revenue from the Indians; their condition, therefore, and the resources of their lands may be represented in a manner somewhat too florid. But under any circumstances the document is, together with the description of Panamá from 1607, the most important and valuable one of the whole collection.

The lack of systematic arrangement of the collection is on a par with the well known "Documentos inéditos de Indias." Few, if any, of the Spanish publications of the kind escape that criticism. Even the regretted Marcos Jiménez de la Espada, although far superior to the editor of the present volume in knowledge and method of handling of American documents, did not find it feasible to introduce strict chronological sequence in the "Relaciónes geográficas de Indias." Still he did at least observe geographical grouping, at which there is only a faint attempt in the book before us. A. F. B.

Old Steamboat Days on the Hudson River. By David Lear Buckman. viii and 143 pp., 22 Illustrations, and Index. The Grafton Press, New York, 1907. (Price, $1.25.)

The author has brought together highly interesting data collected from many sources and relating to the beginnings and development of steam traffic on the Hudson. He tells of Robert Fulton and his first steamboat, the early craft that plied between New York and Albany, the exciting rivalries of competing lines, the floating towns of canal boats, the evolution of steamboat construction, and the palatial steamers of to-day. These tales and reminiscences supply an absorbing chapter in our country's history.

Ripios Geográficos por Antonio de Valbuena (Miguel de Escalada). 8vo, 334 pp. Victoriano Suárez, Madrid, 1905.

This BULLETIN is a geographical, not a political, publication, and it cannot, therefore, discuss the merits of a book devoted exclusively to bitter and often offensively personal criticism of the official geographical institutions of a foreign country. If the misdemeanors and mistakes noted in this book are only partly true, they would indicate for the geographical institutes of Spain a deplorable condition. The author passes in review successively the "Instituto Geográfico," the "Depósito de la Guerra," the Astronomical Observatory, the direction of Public Works, the Dirección de Correos and, finally, some private geographical publications. Nothing finds grace before his eyes, everything is wrong and badly managed, and it would seem as if ignorance, incompetency, and dishonesty ran riot in everything connected with geographical work in and by Spain. That country is probably not much worse than others; favoritism, protection of igno-

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rance, provided the latter is coupled with audacity and bluff, speculation and peculation infest other countries and other fields of science as well, and while we regret that the author of the "Ripios" finds such material for grave condemnation in his native land and among his people we are far from pointing at Spain with the feeling that it is much better here or elsewhere. The book is written with spirit, and shows a certain knowledge of intimate facts wielded with as much dexterity as acrimony. It is for Spaniards exclusively to decide what is true or not in this bitter and venomous onslaught on the government of their nation and the dignity and efficacy of their scientific institutions.

A. F. B.

The North American Indian. By Edward S. Curtis. Edited by Frederick Webb Hodge. In 20 volumes. Vols. I and II. Copiously illustrated by photographs taken by the author, and each volume accompanied by a folio of photogravures. The University Press, Cambridge, U. S. A. [Branch], 1907.

In this sumptuous series of volumes Mr. Curtis proposes to picture and describe the Indians of the United States and Alaska. It is an *édition de luxe*, limited to 500 sets, and all the resources of the printing and pictorial arts are utilized to make the work a superb production. The first volume is devoted to the Navaho and the Apache and the second to nine tribes—the Pima, Papago, Qahatika, Mohave, Yuma, Maricopa, Walapai, Havasupai, and Yavapai.

From about 15 to 50 pages are given to each tribe, describing their habitat and life, mythology, medicine men, rites and ceremonies. At the end of each volume is a summary of each tribe as to its language, population, dress, dwellings, primitive foods, industries, etc., and a full index.

Mr. Curtis has lived much of the time, for the past ten years, among various tribes, and his field work will be continued for years to come. Primarily a photographer, the pictorial feature of these books is the one that will especially attract attention. His photographs are artistic and beautiful and the photogravures are superb. It is often evident that the setting of his Indian pictures has been very carefully selected for the best effect, and the suspicion may often arise that single figures or groups have been posed for artistic purposes. This is certainly reasonable in a book that is intended to be artistic and is necessarily very costly, though the ethnologist will doubtless interpose the objection that many of the pictures give an impression of the Indian, possibly as he ought to be, but not as he really is.

The letterpress is all the more interesting because Mr. Curtis is deeply in sympathy with his subject and has lived with it for years. But his broadly general way of treating the topic is not scientific method, nor can it lead to scientific conceptions of the Indian. These beautiful volumes occupy a field of their own and do not claim to be anything they are not.

The Elements of Geography. By J. H. N. Stephenson. Part 1—General Geography. xiii and 160 pp., Illustrations, and Maps. Edward Stanford, London, 1908. (Price, 3s. 6d.)

The introductory volume of a work intended to be neither "physical" nor "regional" geography, but to coordinate and link them together. The author's aim is to show the mutual relations between physical, regional, and applied geography. His purpose is in line with the new tendency to give greater weight in

educational courses to the interrelations between life and its environment; and his book is a protest against the disproportionate prominence given to physiography, and the indigestible array in text-books of facts of regional geography without showing the relations between them and with other sides of the subject.

In his first book the author treats the fundamentals under the heads of astronomical, inorganic, and organic geography and cartography. He uses the simplest language, his material is well arranged, and one topic leads naturally to the next. His chapters on the atmosphere and the sea, for instance, are a great help towards understanding the chapter on climate; and the chapter on soil and its products leads to the discussion of the relations of man to the soil and its fruits.

The chapter on the making and reading of maps is good as far as it goes. What geography teachers of this country need more than anything else is a simply written volume that will help to cultivate the love of good maps, the comprehension of all their symbolism, and acquaintance with map projections sufficient to enable teachers to appreciate the advantages and the inadequacy of each and the purposes which each serves best.

Some defects should be corrected in a later edition. It is too late to teach that the Gulf Stream, as a current, has a modifying influence upon the climate of northwest Europe.

Most of our teachers may profit by this book. It is illustrated by good maps in colours, black maps, and diagram.

A Gazetteer of the World. By John Tyrrell Baylee. 255 pp. George Routledge & Sons, London, and E. P. Dutton & Co., New York. (Price, 50 cents.)

The book may be carried in the vest pocket. Its purpose is to give in the briefest form essential facts concerning as large a number of places as can be accommodated in so small a volume.

On the Mexican Highlands. With a Passing Glimpse of Cuba. By William Seymour Edwards. 276 pp., many Photographs and Map. Jennings & Graham, Cincinnati, 1906(?). (Price, $1.50.)

The author describes what he sees with vivacity and gives intelligent readers a fairly definite idea of the men, women, and things to be seen in a rapid journey through Mexico. He was long enough in that country to be much impressed with its mineral and agricultural wealth and the solidity and comfort of its leading cities, and he came away with a high opinion of its people. Though entirely on the surface, these pages give accurate impressions of many aspects of everyday life. The book is filled with photographic snap shots.

The Negro Races. A Sociological Study. Vol. 1. By Jerome Dowd. xxiii and 493 pp., Index, and Map. The Macmillan Company, New York, 1907. (Price, $2.50.)

In his three books on the races of Africa of which this is Vol I, the author's primal object is to show that peoples who live under widely different conditions of geographical environment cannot develop the same institutions or pass through the same stages of evolution. Prof. Dowd assigns a larger influence upon human development to geographical environment than is admitted by a considerable number of ethnologists, but he stands on firm ground.

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The entire series will embrace a sociological study of mankind from the standpoint of race, and his first volume, including nearly the whole of the three Africa books, lays greater stress upon the physical environment than will some of the later volumes, because, as the author says:

> Physical environment is always predominant in the early stage of development and only diminishes gradually as man strengthens his intellect and adds to his knowledge. The environment first controls man, after which man controls the environment, and, in any system of sociology, a consideration of the physical forces acting upon man must precede a correct understanding of the later moral and psychological forces.

In the present volume the author treats of the Pygmies, Bushmen, and Hottentots of Central and South Africa whom he classifies as Negritos; the tribes with dark skin and wavy hair in the western and central Sudan, and the Tibbus of the Sahara, whom he calls Nigritians; and the Fellatas of the Sudan. In his chapters on the Pygmies, Bushmen, and Hottentots he strongly and clearly emphasizes the influence of their physical surroundings in shaping their special characteristics. He finds his task more difficult when he writes about a few of the many tribes of the western and central Sudan, but the broad general conclusions he draws as to the effect upon human and other life of the climatic differences marking belts of the Sudan from south to north may easily be accepted. One of the chief merits of the book is the very large amount of systematized data it contains concerning the African peoples and their environment. The authorities for statements made are given in foot-notes and there is a list of the principal books consulted.

L'Or dans le Monde. By Prof. L. de Launay. xxi and 265 pp., and Diagram. Armand Colin, Paris, 1907. (Price, 3.50 fr.)

M. de Launay, Professor in l'École Supérieure des Mines, has here written a book that is comprehensive, accurate, and non-technical. It was not composed for mining engineers, but for all those who desire to have an intelligent idea of the geological formations in which gold is found, its distribution over the world, the methods of extracting it, and its place in economic geography. All the problems relating to gold are discussed, and the author tells us of recent progress in the extractive industry, briefly describes the most famous gold fields, and gives his views of the future of the industry. The treatment is concise but interesting, and the arrangement is so well ordered that it is easy to turn to any phase of the discussion.

Bradshaw's Through Routes to the Chief Cities of the World. Edited by Prof. A. H. Keane and Stanley Reed. xlviii and 656 pp., Maps, Plans, and Index. Henry Blacklock & Co., London. (Price, 5s.)

Few guide books contain so large an amount of information. A copious index makes it easy to refer to each of the thousands of places mentioned. The maps in Bradshaw are always a conspicuous feature. The plans of leading cities of Europe and Asia are in colours, but there are no maps of the large American cities. The next edition should rectify some discrepancies between maps and text. The new hotel at the Victoria Falls in Africa is mentioned, but the map does not show the Cape to Cairo R. R. completed to within hundreds of miles of the Falls, though it now extends far north of them. In the page and a half given to New York city, the elevated roads are mentioned, but not the subway.